



Powerware®

9315

Parallel Capacity/
Redundant UPS

with PowerHandler Plus™
Switchboard System
Bypass Module (SSBM)

INSTALLATION &
OPERATION MANUAL

IMPORTANT SAFETY INSTRUCTIONS

Instructions Importantes Concernant La Sécurité

SAVE THESE INSTRUCTIONS

Conserver Ces Instructions

This manual contains important instructions for your Uninterruptible Power Supply (UPS) system. You should follow these instructions during the installation and maintenance of the UPS, options, accessories, and batteries.

Cette notice contient des instructions importantes concernant la sécurité.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

WARNING:

This is a product for restricted sales distribution to informed partners. Installation restrictions or additional measures may be needed to prevent disturbances.

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Introduction

The Powerware 9315 Parallel Capacity/Redundant online power protection system is utilized to prevent loss of valuable electronic information, minimize equipment downtime, and/or minimize the adverse effect on equipment production due to unexpected power problems.

The Powerware 9315 Parallel Capacity/Redundant System continually monitors incoming electrical power and removes the surges, spikes, sags, and other irregularities that are inherent in commercial utility power. Working with your building's electrical system, the Parallel Capacity/Redundant System supplies clean, consistent power that your sensitive electronic equipment requires for reliable operation. And during brownouts, blackouts, and other power interruptions, optional battery racks provide emergency power to safeguard your operation.

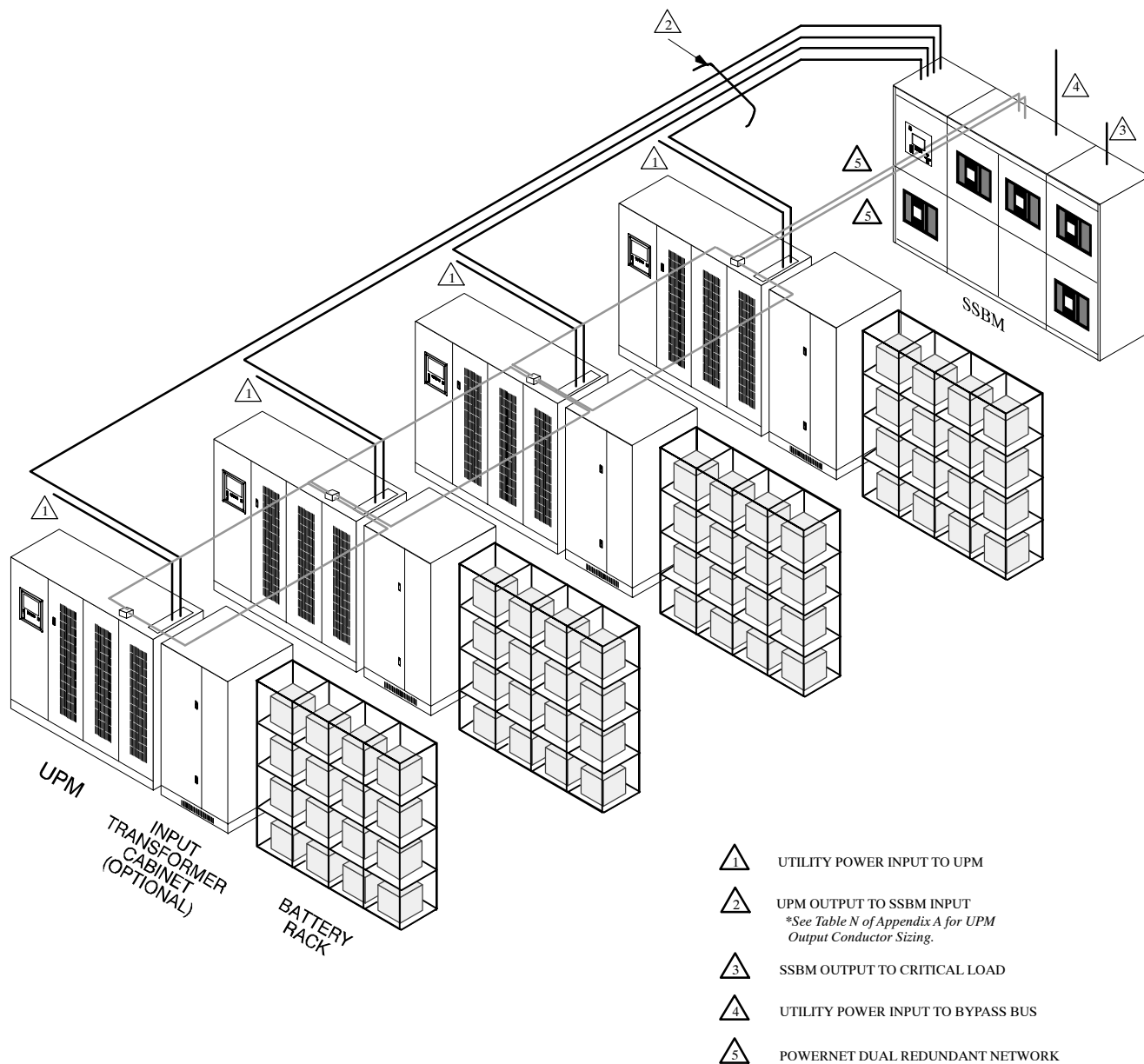
The Parallel Capacity/Redundant system, using the *Powerware PowerHandlerPlus™ Switchboard System Bypass Module (SSBM)*, allows two to eight UPMs to operate in parallel to provide more capacity than a single UPM and as backup for each other. The Parallel Capacity/Redundant system can supply up to 4000 Amps, depending on the SSBM used. In addition, when one UPM is taken out of service for maintenance or is not operating properly, the redundant UPM continues to supply uninterrupted power to the critical load. The Parallel Capacity/Redundant system refers to the SSBM in conjunction with the UPMs. The Parallel Capacity/Redundant system consists of a Switchboard System Bypass Module with optional System Maintenance Bypass (SMB), two or more UPMs, and battery racks or cabinets. Each UPM may have its own battery rack, or may share the same battery rack with the other UPMs. The SSBM has temporary load bank tabs to allow full load testing of the UPMs and the SSBM.

Your UPMs functions automatically and requires very little attention during normal operation. However, you should read and understand the procedures described in this manual to ensure trouble-free operation. In particular, you should be thoroughly familiar with the Emergency UPM Off procedure described in Chapter 7 of this manual and Emergency Load Off procedure described in the **Powerware® 9315 UPS Operation** manual provided with the UPM.

This manual describes how to install and operate your Powerware® 9315 Parallel Capacity/Redundant system. The installation section contains instructions for installing the *Powerware PowerHandlerPlus™ Switchboard System Bypass Module (SSBM)*. The operation section contains instructions for operating the SSBM and UPMs while paralleling for capacity/redundancy. The information you use depends on the system you purchased.

NOTE: *The installation procedures of this manual only refer to the SSBM and its connection to the UPS modules for parallel capacity/redundancy operation. The operation section of this manual refers to the operation for the SSBM and the UPMs when paralleling for capacity/redundancy. For full installation and operation of the UPMs, refer to the **Powerware® 9315 UPS Installation and Powerware® 9315 UPS Operation** manuals provided with the UPMs.*

Each component of your Parallel Capacity/Redundant system is housed in a free-standing cabinet. The UPM cabinets line up and match in style and color, and have safety shields behind the doors for hazardous voltage protection. Figure 1 shows a typical Parallel Capacity/Redundant System.



- NOTE:**
1. Accommodates one to eight UPMs. Four UPM system shown.
 2. The input transformer cabinet may be installed on either the left or the right side of the UPM cabinet.
 3. Refer to the **Powerware® 9315 UPS Installation** manual provided with the UPMs, for UPM, battery, and optional input transformer installation information.
 4. Actual SSBM physical arrangement and cable connection locations may differ from that shown. See enclosed switchboard vendor drawings for details.

- 1 UTILITY POWER INPUT TO UPM
- 2 UPM OUTPUT TO SSBM INPUT
*See Table N of Appendix A for UPM Output Conductor Sizing.
- 3 SSBM OUTPUT TO CRITICAL LOAD
- 4 UTILITY POWER INPUT TO BYPASS BUS
- 5 POWERNET DUAL REDUNDANT NETWORK
SSBM INTERFACE - TERMINAL BLOCK TB1
UPM INTERFACE - TERMINAL BLOCK TB1
FOR 9315-625/750 UPM ONLY:
ALSO INCLUDES DUAL REDUNDANT NETWORK POWER SUPPLY
SBM INTERFACE - TB7
UPM INTERFACE - CANA & CANB

Figure 1. Typical Parallel Capacity/Redundant System with SSBM

Basic System Configurations

The following Parallel Capacity/Redundant system configurations are possible with the PowerHandler Plus Switchboard System Bypass Module (SSBM):

- *SSBM with Temporary Load Bank Tabs*, two or more UPS modules, and one battery rack for each module
- *SSBM with Temporary Load Bank Tabs*, two or more UPS modules, and one common battery rack
- *SSBM with Temporary Load Bank Tabs*, two or more UPS modules, one battery rack for each module, and an input transformer
- *SSBM with Temporary Load Bank Tabs*, two or more UPS modules, one common battery rack, and an input transformer
- *SSBM with Temporary Load Bank Tabs, optional System Maintenance Bypass (SMB)*, two or more UPS modules, and one battery rack for each module
- *SSBM with Temporary Load Bank Tabs, optional System Maintenance Bypass (SMB)*, two or more UPS modules, and one common battery rack
- *SSBM with Temporary Load Bank Tabs, optional System Maintenance Bypass (SMB)*, two or more UPS modules, one battery rack for each module, and an input transformer
- *SSBM with Temporary Load Bank Tabs, optional System Maintenance Bypass (SMB)*, two or more UPS modules, one common battery rack, and an input transformer

The optional System Maintenance Bypass (SMB) is available with electrical interlocks, or electrical interlocks with Redundant CBP control.

You can enhance any of these system configurations by adding optional accessories, such as a *Remote Monitor Panel (RMP)*, *Relay Interface Module (RIM)*, *Supervisory Contact Module (SCM)*, or *Remote Emergency Power Off (EPO)* control.

Using This Manual

The information in this manual is divided into the sections and chapters listed. The system you are installing dictates which parts of this manual you should read. Everyone should read the Introduction, Chapters 1 and 2 and Chapters 7 through 12:

Introduction

The Introduction provides a brief description of the Parallel Capacity/Redundant system, a description of the content of each chapter, safety, text conventions used in the manual and reference information.

Section I

- **Chapter 1 – Getting Started** – tells you how to prepare your site for the installation of your Parallel Capacity/Redundant system. It discusses equipment environmental requirements, inspecting, and unpacking cabinets.
- **Chapter 2 – Installing the Parallel Capacity/Redundant System** – describes how to install the SSBM and provides references for installing UPMs and optional equipment.
- **Chapter 3 – Installing a Remote EPO Control** – contains information for installing the optional *Remote Emergency Power Off (EPO)* control.
- **Chapter 4 – Installing a Remote Monitor Panel** – contains information for installing the optional *Remote Monitor Panel (RMP)*.
- **Chapter 5 – Installing a Relay Interface Module** – contains information for installing the optional *Relay Interface Panel (RIM)*.
- **Chapter 6 – Installing a Supervisory Contact Module** – contains information for installing the optional *Supervisory Contact Module (SCM)*.

Section II

- **Chapter 7 – Understanding Parallel Capacity/Redundant Operation** – provides information on understanding parallel operation.
- **Chapter 8 – Operational Controls and Features** – describes the standard and optional operational features and controls of the parallel capacity/redundant system.
- **Chapter 9 – Using the Control Panel** – describes the controls and indicators found on the Control Panel and shows the various information screens displayed on the LCD screen.
- **Chapter 10 – Operating Instructions for the Parallel Capacity/Redundant System** – contains startup and shutdown procedures for the Parallel Capacity/Redundant system.
- **Chapter 11 – Using Features and Options** – contains descriptions and instructions for the Parallel Capacity/Redundant system features and options.
- **Chapter 12 – Responding to System Events** – lists all the alarm, messages and notices that occur during operation of the Parallel Capacity/Redundant system.

- **Chapter 13 – Serial Communications** – describes the serial communications features of the Parallel Capacity/Redundant system.
- **Chapter 14 – Remote Notification** – contains instructions for using the remote notification feature of the Parallel Capacity/Redundant system.
- **Chapter 15 – Maintaining the Parallel Capacity/Redundant System** – contains maintenance instructions for the Parallel Capacity/Redundant system.
- **Chapter 16 – Product Specifications** – provides detailed specifications for the Parallel Capacity/Redundant system.
- **Appendix A – Customer Information** – contains important information on wiring requirements and recommendations, and important diagrams of the mechanical details and electrical access.

Read through each procedure before you begin. Perform only those procedures that apply to the Parallel Capacity/Redundant system you are installing or operating.

Conventions Used in This Manual

The text in this manual uses these conventions:

- **Bold type** highlights important concepts in discussions, key terms in procedures, and menu options.
- *Italic type* highlights notes and new terms where they are defined.
- Rectangular boxes containing bold type are warnings or cautions that pertain to the Parallel Capacity system or its electrical connections.

In this manual, the term *SSBM* refers only to the Switchboard System Bypass Module and its internal elements. The term *Parallel Capacity/Redundant system* refers to the entire power protection system—the SSBM, UPS modules, battery racks and options or accessories installed.

Safety Considerations

The UPS cabinet and SSBM enclosures are designed for industrial or computer room applications, and contain safety shields behind the doors. However, the parallel redundant system is a sophisticated power system and should be handled with appropriate care, following these guidelines:

- **Keep surroundings clean and free from excess moisture.**
- **Do not operate the parallel redundant system close to gas or electric heat sources.**
- **The system is not intended for outdoor use.**
- **The operating environment should be maintained within the parameters stated in this manual and the *Powerware 9315 Operation* manual provided with the UPS system.**
- **Keep the cabinet doors closed to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit.**
- **The parallel redundant system contains its own power source. Lethal voltages are present even when the UPS is disconnected from utility power.**

<p>WARNING: Only AUTHORIZED SERVICE PERSONNEL should perform service or maintenance on the parallel redundant system.</p>

If service or routine maintenance is required:

- **Ensure all power is disconnected before performing installation or service.**
- **Ensure the area around the parallel redundant system is clean and uncluttered.**
- **Battery cabinet maintenance or battery replacement should be performed only by authorized service personnel.**
- **Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.**
- **Refer to the more detailed safety precautions described in the *Powerware 9315 Operation* manual provided with the UPS system.**

For More Information

This manual describes how to install and operate your Parallel Capacity/Redundant system. For more information about the installation and operation of the UPS modules, refer to the following:

164201037 ***Powerware® 9315 (200 kVA – 300 kVA) UPS Installation***

164201118 ***Powerware® 9315 (400 kVA – 500 kVA) UPS Installation***

Provides installation instructions for the UPS cabinet, and optional components and accessories. Site preparation, planning for installation, and wiring and safety information are supplied. Detailed illustrations of cabinets and optional accessories, including dimensional and connection point drawings are provided.

164201036 ***Powerware® 9315 (200 kVA – 300 kVA) UPS Operation***

164201119 ***Powerware® 9315 (400 kVA – 500 kVA) UPS Operation***

Describes the UPS cabinet Control Panel and Monitor Panel, and explains the functions of the UPS; discusses the standard features of the UPS and optional accessories; provides procedures for starting and stopping the UPS, and information about maintenance and responding to system events.

Also described are the RS–485 and RS–232 serial communications capabilities of the UPS system; discusses the two communications ports on the Customer Interface Panel inside the UPS and how to connect optional remote accessories to your UPS system; provides information about enabling, disabling, and customizing building alarms.

164201244 ***Powerware® 9315 (500 kVA – 750 kVA) UPS Installation/Operation***

Provides installation instructions for the UPS cabinet, and optional components and accessories. Site preparation, planning for installation, and wiring and safety information are supplied. Detailed illustrations of cabinets and optional accessories, including dimensional and connection point drawings are provided.

Describes the UPS cabinet Control Panel and Monitor Panel, and explains the functions of the UPS; discusses the standard features of the UPS and optional accessories; provides procedures for starting and stopping the UPS, and information about maintenance and responding to system events.

Also described are the RS–485 and RS–232 serial communications capabilities of the UPS system; discusses the two communications ports on the Customer Interface Panel inside the UPS and how to connect optional remote accessories to your UPS system; provides information about enabling, disabling, and customizing building alarms.

Contact your local Powerware Field Service office for information on how to obtain copies of this manual.

Getting Help

If you have a question about any of the information in this manual, or if you have a question this manual does not answer, please call Powerware Corporation Field Service:

United States	1-800-843-9433
Canada	1-800-461-9166
Outside the U.S.	Call your local representative

Section I

Installation

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1.1 Installing the UPS

The *Switchboard System Bypass Module (SSBM)* and UPMs of the Parallel Capacity/Redundant system are shipped on separate pallets. Use a forklift or pallet jack to move the packaged cabinets to the installation site, or as close as possible to the site, before unloading from the pallet.

This is the basic sequence of the installation steps:

1. Create an installation plan for the Parallel Capacity/Redundant system (Chapter 1).
2. Prepare your site for the Parallel Capacity/Redundant system (Chapter 1).
3. Inspect, unpack, and unload the SSBM (Chapter 1).
4. Inspect, unpack, and unload the UPMs (refer to the applicable *Powerware® 9315 Installation* manual provided with the UPM).
5. Wire the system (refer to Chapter 2 and the applicable *Powerware® 9315 Installation* manual provided with the UPM).
6. Install features, accessories, and/or options, as applicable (Chapter 3).
7. Complete the Installation Checklist (Chapter 2).
8. Have authorized service personnel perform preliminary operational checks and startup.

NOTE: *Startup and operational checks should be performed only by authorized service personnel. This service is usually offered as part of the sales contract for your Parallel Capacity/Redundant system. Contact service in advance (usually a two week notice is required) to reserve a preferred startup date.*

1.1.1 Creating an Installation Plan

Before beginning to install the Parallel Capacity/Redundant system, read and understand how this manual applies to the system being installed. Use the procedures and illustrations in the following chapters to create a logical plan for installing the system. It is important to note that UPM installation procedures are contained in the applicable *Powerware® 9315 Installation* manual provided with the UPMs. First understand how to install the UPMs before installing the SSBM. The information in Chapter 2 of this manual provides a guide to installation of the SSBM to the UPMs.

1.1.2 Preparing Your Site

For your Parallel Capacity/Redundant system to operate at peak efficiency, your installation site should meet the environmental parameters outlined in the operator's manual for the SSBM and UPMs. If you intend to operate the system at an altitude higher than 1500 meters (5000 feet), contact your local sales or service office for important information about high altitude operation. The operating environment must meet the size and weight requirements shown in the enclosed vendor drawings.

The basic environmental requirements for operation of the Parallel Capacity/Redundant system are:

Ambient Temperature Range: 0–25° C (32–77° F)

Recommended Operating Range: 20–25° C (68–77° F)

Maximum Relative Humidity: 95% noncondensing

The UPM cabinets use forced air cooling to regulate internal component temperature. The SSBM, battery and optional component cabinets use convection cooling to regulate internal component temperature. Air inlets are in the front of the cabinet, and outlets are in the top. You must allow clearance in front of and above each cabinet for proper air circulation.

1.1.3 Environment Considerations

The life of the Parallel Capacity/Redundant system will be adversely affected if the installation does not meet the following guidelines:

1. The system must be installed on a sealed concrete pad or a sealed concrete floor.
2. The system must be installed in a temperature-controlled indoor area free of conductive contaminants.

1.1.4 Preparing for Wiring the Parallel Capacity/Redundant System

NOTE: *The external wiring and conduit sizings described in this manual are only provided as a recommended approach. Many design considerations may require an external wiring and conduit configuration much different than the examples provided in this manual. Applicable local codes and national codes must be followed.*

Table A in Appendix A covers SSBM and SMB power cabling for a 3Ø / 3W system. Table A is based on the entire 3Ø / 3W system being in a 25° C room ambient and the use of 90° C copper wire. The 500kcmil and 600kcmil cables are used as examples.

Table B in Appendix A covers SSBM and SMB power cabling for a 3Ø / 4W system. Table B is based on the entire 3Ø / 4W system being in a 25° C room ambient, use of 90° C copper wire and a 0.80 derating factor because there are more than three current carrying conductors in a raceway (NEC Table 310–16 and Notes). The 500kcmil and 600kcmil cables are used as examples.

NOTE: Two tables in Appendix A cover the cables running from the UPM output terminals to the SSBM module input terminals E8 (ØA), E9 (ØB), E10 (ØC), and E4 (Neutral)

Table O covers the recommended wiring and conduit sizing based on the applicable Powerware 9315 Installation manual provided with the UPM. Using the noted power wiring, Table O shows the number of UPMs that can be connected to each SSBM model. This number of UPMs is limited by the number of cables connections for the SSBM module input terminals E8, E9, E10, and E4 shown in Table C in Appendix A.

If the parallel capacity/redundant system requires the connection of more UPMs to the SSBM than is shown in Table O, refer to Table P. Table P covers the recommended wiring and conduit sizing to support connection of the maximum number of UPMs (up to eight) for each SSBM model.

CAUTION:

The UPM output wiring configurations in Table O in Appendix A do not match that shown in the applicable Powerware 9315 UPS Installation manual. Review the planned UPM output power cables to ensure the planned cabling is compatible with the available number of cable connections at both the UPM and SSBM terminals.

Powerware UPMs are rated for operation in a 40°C room ambient. For this reason, Table O and P are based on the entire 3Ø/3W system being housed in a 40°C room ambient, the use of 90°C copper wire and a 0.80 derating factor because there are more than three current carrying conductors in a raceway (NEC Table 310–16 and Notes).

Refer to the applicable Powerware 9315 Installation manual provided with the UPM for all other UPM power cable requirements (AC input, DC input, and grounding)

NOTE: Review Table C in Appendix A to ensure the planned power cable configuration is compatible with the available number of cable connections at each SSBM and SBM terminal.

NOTE: If additional cable connections are required, consider using FCI Hystack Type ASA–U adapters. Hystack P/N ASA250U covers NEMA 2-hole terminals for wire sizes from #8 AWG to 250kcmil. Hystack P/N ASA800U covers NEMA 2-hole terminals for wire sizes from #8 AWG to 800kcmil. Care must be taken in Hystack adapters to ensure the required phase-to-phase clearance of 1 inch and phase-to-ground clearance of 1 inch (1.5 inches in Canada) is maintained.

For external wiring, including the recommended minimum AWG size of external wiring, see Tables A, B, O, and P in Appendix A. The power wiring connections for this equipment are rated at 90°C. If wire is run in an ambient temperature greater than noted above, higher temperature and/or larger size wire may be necessary. Control wiring for PowerNet, EPO and optional accessories (such as building alarms, monitoring interface and Maintenance Bypass control) should be connected at the customer interface panel at the top of the SSBM Powernode Panel (A1), which is shown in drawing 164201373–12 in Appendix A.

1.1.5 Inspecting and Unpacking Each Cabinet

NOTE: Refer to the applicable Powerware® 9315 Installation manual provided with the UPMs for UPM unpacking instructions.

The first task in preparing for installation is inspecting and unpacking the SSBM. The SSBM is shipped in sections which are bolted to wooden pallets and protected with outer protective packaging material as shown in Figure 1–1 and a plastic inner covering.

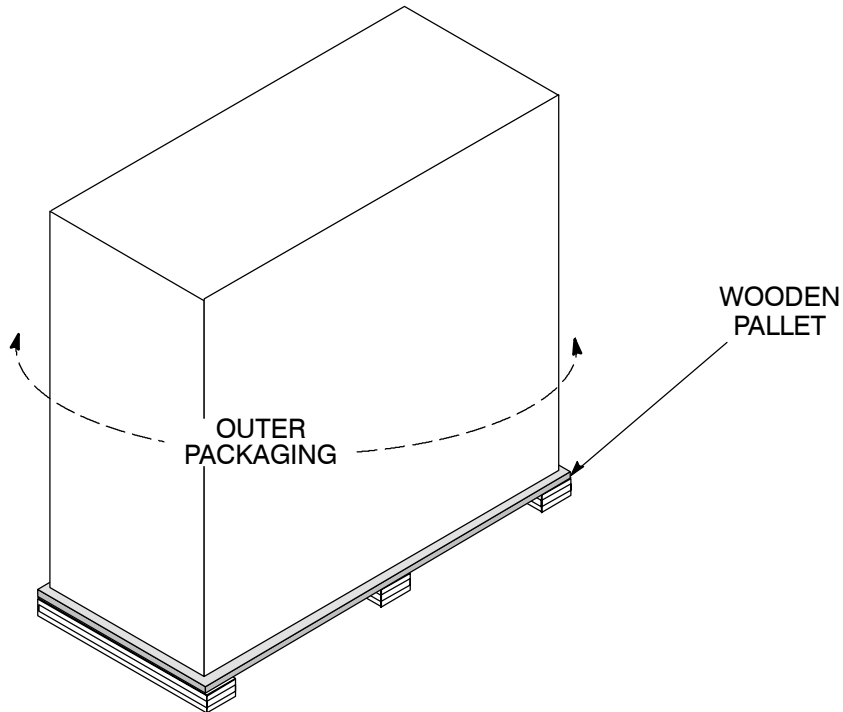


Figure 1–1. Cabinets as Shipped, with Outer Packaging and Pallet

1. Carefully inspect the outer packaging for evidence of damage during transit.

CAUTION:

Do not install a damaged cabinet. Report any damage to the carrier and contact your local sales or service office immediately.

CAUTION:

Only insert the forklift jacks where “FORK HERE” signs appear on cabinet packaging.

2. Use a forklift or other material handling equipment to move the cabinet to a convenient unpacking area. Insert the forklift jacks between the raised supports on the bottom of the pallet.

CAUTION:

Do not tilt cabinets more than 10 degrees from vertical.

3. Set each pallet on a firm, level surface, allowing a minimum clearance of 4.6m (15 ft) on each side for removing the cabinets from the pallets.

4. Remove the protective plastic wrap and cardboard covering from the cabinets, using a knife blade no longer than 25 mm (1 in.).
5. Discard or recycle the wrapping materials in a responsible manner.
6. After removing the protective covering, inspect the contents for any evidence of physical damage, and compare each item with the Bill of Lading. If damage has occurred or shortages are evident, contact Powerware Corporation Customer Service Department immediately to determine the extent of the damage and its impact upon further installation.

NOTE: *While awaiting installation, protect the unpacked SSBM and UPS cabinets in an indoor area free from moisture, dust, and other harmful contaminants in a rodent-free area with moderate temperatures.*

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Installing the Parallel Capacity/Redundant System



2.1 Preliminary Installation Information

WARNING:
Installation should be performed only by qualified personnel.

Refer to the following while installing the Parallel Capacity/Redundant system:

- Appendix A of this manual for installation drawings and additional installation notes.
- Dimensions in this manual are in millimeters and inches.
- Do not tilt the Switchboard System Bypass Module (SSBM), UPMs or other cabinets more than $\pm 10^\circ$ during installation.
- The conduit landing plates are to be removed to add conduit landing holes as required. Plate material is generally 16 gauge steel (0.06 in. thick).
- The Remote Emergency Power Off (EPO) and the EMERGENCY UPM OFF pushbuttons open all breakers in the SSBM, shut down the UPMs, and isolates power from your critical load. Local electrical codes may also require tripping protective devices upstream from the UPMs.
- The SSBM cabinet must be installed on a level, sealed concrete pad or floor. The floor or pad must be strong enough to prevent sagging or cracking from the SSBM weight. If the floor area is subject to vibrations, special mounting must be provided to prevent transmitting the vibrations to the SSBM.
- If perforated floor tiles are required for ventilation, place them in front of the UPMs.
- Details about control wiring are provided in each procedure for connecting options and features. Drawings 164201373–4 through 164201373–7 in Appendix A identify the control wiring terminations.

2.2 *Installing the Switchboard System Bypass Module*

The SSBM is shipped in separate shipping sections. Each shipping section is bolted to a wooden pallet.

WARNING:

The SSBM shipping sections are extremely heavy. If unloading instructions are not closely followed, the sections may tip and cause serious injury.

1. Find section labels on each shipping section. Install the shipping sections in numerical order.

CAUTION:

Only insert the forklift jacks where “FORK HERE” signs appear on cabinet packaging.

2. Move the SSBM to final installed location using forklift jacks between the raised supports on the bottom of the unit.
3. Remove side panels from SSBM cabinet to gain access to hardware securing cabinet to pallet.
4. Remove hardware securing cabinet to pallet.

CAUTION:

Lift only at lifting eyes or cabinet damage may occur..

5. Attach suitable hoist to SSBM lifting eyes and lift SSBM cabinet until the cabinet bottom clears the pallet by approximately 3 mm (1/8 in.).
6. Once SSBM cabinet is clear of the pallet, pull the pallet from under the UPS cabinet. Discard or recycle them in a responsible manner.
7. Carefully lower the SSBM cabinet until the cabinet base contacts the floor.
8. Remove lifting eyes from SSBM cabinet.
9. With the shipping section in their final locations, align SSBM shipping sections.
10. Bolt shipping sections together with supplied hardware and anchor to floor or pad.
11. Install all Bypass, Critical, and Neutral Bus shipping split bus plates. Torque supplied hardware to 30 ft-lbs.
12. Install all Ground Bus shipping split bus plates. Tighten supplied hardware.
13. Run section wiring harnesses through wire trough in rear cabling area and pass into Control section through grommets opening.
14. Insert harness plugs into match caps in the bottom of the A1 Panel in the Control Section.

2.3 **Installing Optional System Maintenance Bypass (SMB)**

The System Maintenance Bypass is shipped as a separate shipping section. The SMB section is bolted to a wooden pallet.

CAUTION:
The SMB is heavy. If unloading instructions are not followed closely, the cabinet may tip and cause serious injury or damage. Do not tilt cabinets more than 10 degrees from vertical.

1. Find section label on SMB. Install the SMB in numerical order with SSBM shipping sections.

CAUTION:
Only insert the forklift jacks where “FORK HERE” signs appear on cabinet packaging.

2. Move the SMB to final installed location on the right side of the SSBM shipping sections using forklift jacks between the raised supports on the bottom of the unit.
3. Remove side panel from SMB cabinet to gain access to hardware securing cabinet to pallet.
4. Remove hardware securing cabinet to pallet.

CAUTION:
Lift only at lifting eyes or cabinet damage may occur.

5. Attach suitable hoist to SMB lifting eyes and lift SMB cabinet until the cabinet bottom clears the pallet by approximately 3 mm (1/8 in.).
6. Once SMB cabinet is clear of the pallet, pull the pallet from under the UPS cabinet. Discard or recycle them in a responsible manner.
7. Carefully lower the SMB cabinet until the cabinet base contacts the floor.
8. Remove lifting eyes from SMB cabinet.
9. With the SMB in its final location, align with SSBM shipping sections.
10. Bolt SMB to SSBM with supplied hardware and anchor to floor or pad.
11. Install all Bypass, Critical, and Neutral Bus shipping split bus plates. Torque supplied hardware to 30 ft-lbs.
12. Install all Ground Bus shipping split bus plates. Tighten supplied hardware.
13. Run SMB wiring harnesses through wire trough in rear cabling area and pass into Control section through grommeted opening.
14. Connect Mate-N-Lock plug and cap at temporary Load Bank current transformers.
15. Insert harness plugs into matching caps in the bottom of the A1 Panel in the Control Section.

2.4 Installing the Powerware Static Switch

Your Switchboard System Bypass Module (SSBM) includes the Powerware static switch shown below.

SSBM Current Rating	Static Switch Current Rating	Static Switch Type	Static Switch Manufacturer	Static Switch Weight kg (lbs)
2500A	2500A	Fully Rated	Powerware	91 (200)
3000 to 4000A	4000A	Fully Rated	Powerware	227 (500)

2.4.1 Installing a Fully Rated Static Switch (2500A or 4000A)

WARNING:

The SSBM should be shut down prior to installing the static switch.

If the SSBM cannot be shut down, transfer the SSBM to Bypass and manually open the FBP breaker prior to installing the static switch.

If the SSBM is supplied with a System Maintenance Bypass (SMB), transfer the SSBM to Maintenance Bypass prior to installing the static switch.

Using an adequate lifting device, install the fully rated static switch in the same manner as a drawout circuit breaker.

2.5 Installing SSBM or SMB Circuit Breakers

The SSBM and SMB are equipped with General Electric PowerBreak®II drawout circuit breakers.

SSBM Current Rating	Circuit Breaker Current Rating (100% Rated)	Circuit Breaker Manufacturer	Circuit Breaker Weight kg (lbs)
2500A/100 kAIC	2500A/100 kAIC	General Electric	110 (242)
3000A/65 kAIC	3000A/65 kAIC	General Electric	110 (242)
3000A/100 kAIC	3000A/100 kAIC	General Electric	110 (242)
4000A/65 kAIC	4000A/65 kAIC	General Electric	138 (304)
4000A/100 kAIC	4000A/100 kAIC	General Electric	138 (304)

2.5.1 Installing an SSBM or SMB Circuit Breaker

NOTE: The General Electric installation instructions and user's guides noted below are available at the GE Industrial Systems Publications Library website of <http://www.geindustrial.com/cwc/library>.

Using an adequate lifting device, install the SSBM and SMB circuit breakers per instructions in GE Document GEH-6271, *Installation Instructions for PowerBreak™II Circuit Breakers, Draw-Out 800-4000 Ampere Frames*.

2.5.2 Setting the Power+ Trip Unit

As received, the long-time delay, long-time pickup, and instantaneous trip settings are at their maximum values. It is the user's responsibility to install the long-time delay, long-time pickup, and instantaneous trip settings which are in compliance with their overall coordination study.

Using GE Document DEH-049, *User's Guide for the Power+™ Trip Unit*, set the required long-time delay, long-time pickup, and instantaneous trip settings on all SSBM and SMB circuit breakers trip units.

NOTE: *The applicable time-current curve is GE Document GES-9890E.*

2.6 Installing UPM Cabinets

To install the UPMs, refer to the **Powerware 9315 UPS Installation** manual provided with the UPMs.

2.7 Installing SSBM Wiring

NOTE: *Refer to section 1.1.4 for additional guidance for wiring and conduit placement.*

NOTE: *For SSBM with 100 kAIC short circuit rating, power rating must be secured as shown in drawing 164201373-1.*

1. Install input power wiring to the SSBM and power wiring between the UPMs, SSBM, and critical load. Each UPM is individually wired to the SSBM UPM input bus. Refer to Appendix A of this manual for wiring and termination requirements and wiring access information.
2. Install control wiring between UPMs and the SSBM. PowerNet network is wired serially (daisy-chained) between UPMs and SSBM. Wire dual redundant PowerNet in separate conduits for maximum failure protection. Refer to Appendix A of this manual for wiring and termination requirements and wiring access information.
3. If a common UPM battery is being used, a separate DC source disconnect device must be provided for each UPM. Wire shunt/UV DC disconnect trip and battery breaker open signals from each UPM to the respective DC source disconnect.
4. After wiring the Parallel Capacity/Redundant system to the facility power and critical load(s), be sure to ground the system according to local and/or national electrical wiring codes, using your own cabling and conduit.
5. Install batteries in accordance with all applicable codes and regulations, including the National Electrical Code (NEC), Article 480.

2.8 Installing Optional SMB Wiring

NOTE: Refer to section 1.1.4 for additional guidance for wiring and conduit installation.

NOTE: For SMB with 100 kAIC short circuit rating, power rating must be secured as shown in drawing 164201373-1.

Install power wiring to the SMB and between the SMB and critical load. Refer to Appendix A of this manual for wiring and termination requirements and wiring access information.

2.9 Preparing for Installing Optional Accessories

If you are installing optional accessories, such as a *Remote Monitor Panel (RMP)*, a *Relay Interface Module (RIM)*, a *Supervisory Contact Module (SCM)*, or a *Remote Emergency Power Off (EPO)*, you must install conduit between each device and the UPS cabinet for wiring these options. Refer to Appendix A for the locations of the interface points within the SSBM cabinet.

To prepare the SSBM for wiring to an RMP, RIM, SCM, or Remote EPO:

1. Be sure the Parallel Capacity/Redundant system is turned off and all power sources are removed. (See the operation section of this manual for shutdown instructions.)
2. Remove the access plate on top of the SSBM control section to gain access to the Customer Interface Panel (refer to Appendix A for location of the access plate).
3. Refer to Chapters 3, 4, 5, or 6 as applicable for installation instructions.

2.10 Initial Startup

Startup and operational checks should be performed only by authorized service personnel. Contact service in advance (usually a two week notice is required) to reserve a preferred startup date.

2.11 Completing the Installation Checklist

The final step in installing your Parallel Capacity/Redundant system is completing the following Installation Checklist. This checklist ensures that you have completely installed all hardware, cables, and other equipment. Completing all items listed on the checklist will ensure a smooth installation. You should make a copy of the Installation Checklist before filling it out, and retain the original.

After your installation is complete, a service representative will be able to verify the operation of your Parallel Capacity/Redundant system and commission it to support your critical load. The service representative cannot perform any installation tasks other than verifying software and operating setup parameters. Service personnel may request a copy of the completed Installation Checklist to be sure you have completed all applicable equipment installation.

NOTE: *The Installation Checklist MUST be completed prior to starting the Parallel Capacity/Redundant system for the first time.*

2.12 Installation Checklist

- All packing materials and restraints have been removed from each cabinet.
- Each cabinet in the Parallel Capacity/Redundant system is placed in its installed location.
- A ground bond is installed between any cabinets that are bolted together.
- All switchboards, conduits, and cables are properly routed to the SSBM, UPMs and auxiliary cabinets.
- All power cables are properly terminated.
- A ground conductor is properly installed.
- If neutral connection is used, no other N–G bonds exist downstream from the UPMs.
- Battery cables and harness are terminated on E4 and E5.
- Internal battery cabinet connections have been completed (bus bars, plugs, etc.).
- Shunt trip signal wiring is connected from UPMs to battery breaker(s).
- Air conditioning equipment is installed and operating correctly.
- The area around the installed Parallel Capacity/Redundant system is clean and dust-free. (It is recommended that the Parallel Capacity/Redundant system be installed on a sealed concrete pad or a sealed concrete floor.)
- Adequate work space exists around the SSBM, UPMs and other cabinets.
- Adequate lighting is provided around the Parallel Capacity/Redundant system.
- A 120VAC service outlet is located within 25 feet of the Parallel Capacity/Redundant system.
- All circuit breaker trip units settings have been completed per the user's coordination study.
- Each Remote Monitor Panel (RMP) is mounted in its installed location. (OPTIONAL)
- The control wiring for each RMP is terminated inside the UPS cabinet. (OPTIONAL)
- The Remote Emergency Power Off (EPO) device is mounted in its installed location and its wiring terminated inside the SSBM. (OPTIONAL)
- Summary alarms and/or building alarms are wired appropriately. (OPTIONAL)
- A Relay Interface Module (RIM) is mounted in its installed location and its wiring is terminated inside the SSBM. (OPTIONAL)
- A remote battery disconnect control is mounted in its installed location and its wiring is terminated inside the UPS and battery cabinet. (OPTIONAL)
- Startup and operational checks performed by authorized service personnel.

Installing a Remote EPO Control

3

The Remote EPO control arrives as shown in Figure 3–1. See Drawing 164201373–7 in Appendix A for wiring information, enclosure dimensions, side views, and knockout patterns.

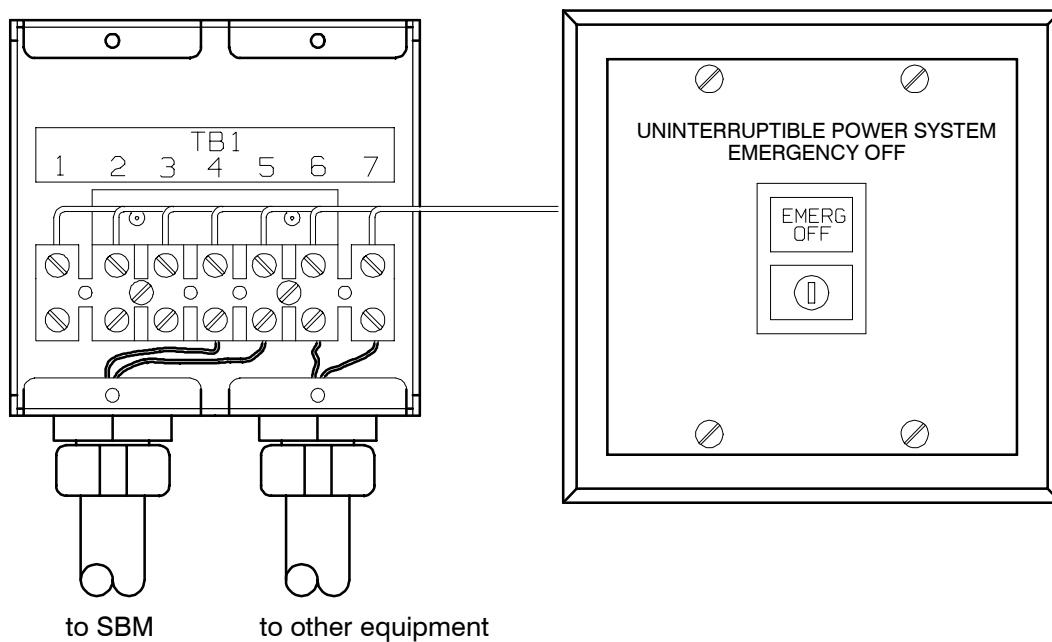


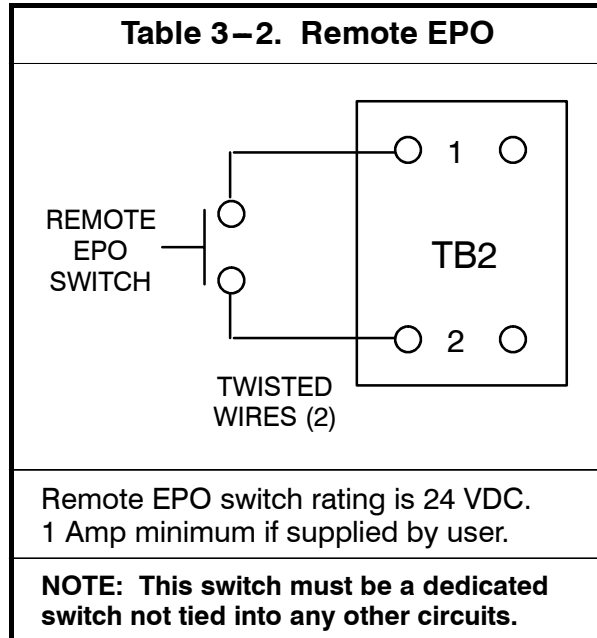
Figure 3–1. Remote EPO Control

NOTE: Before installing an Remote EPO, be sure you have prepared the SSBM according to the instructions in Chapter 2.

To install a Remote EPO control:

1. Securely mount the Remote EPO station. Recommended locations include operator’s consoles or exit doors.
2. Install wiring from the Remote EPO station using ½-in. conduit through the cable entry panels on the top of the SSBM.
3. Connect the Remote EPO wiring as shown in Tables 3–1 and 3–2:

Table 3–1. Remote EPO Wire Terminations		
<i>From Remote EPO Station(s)</i>	<i>To Customer Interface Panel in SSBM</i>	<i>Remarks</i>
TB1–4	TB2–1	Twisted wires (2) 14–18 gauge
TB1–5	TB2–2	



4. If you are installing multiple Remote EPO stations, wire additional stations in parallel with the first Remote EPO.
5. If required, install ½-in. conduit and wiring from the Remote EPO station to trip circuitry of upstream protective devices. A normally open contact is provided, as shown in Table 3–2. Remote EPO switch wiring must be in accordance with UL Class 1 requirements.
6. Secure the SSBM by reversing all steps taken to prepare it for Remote EPO installation.

Installing a Remote Monitor Panel

4

4.1 Installation Procedures

As an option, you can install Remote Monitor Panels (RMPs) to monitor the operation of the Parallel Capacity/Redundant system from virtually any location within your facility, up to 500 feet from the *Switchboard System Bypass Module (SSBM)*. You can flush-mount or surface-mount an RMP on a desktop or on a wall, wherever you have a serial interface line. A maximum of two monitoring accessories (RMPs, RIMs, or SCMs) can be installed. See Table 4–1 for the number of accessories permitted. Figure 4–1 shows an RMP. Drawing 164201373–8 in Appendix A shows the enclosure dimensions and knockout patterns.

Table 4–1. Optional Monitoring Accessories		
Number and Type of Accessories Permitted		
Remote Monitor Panel	Relay Interface Module	Supervisory Contact Module
2	—	—
—	2	—
—	—	2
1	1	—
1	—	1
—	1	1

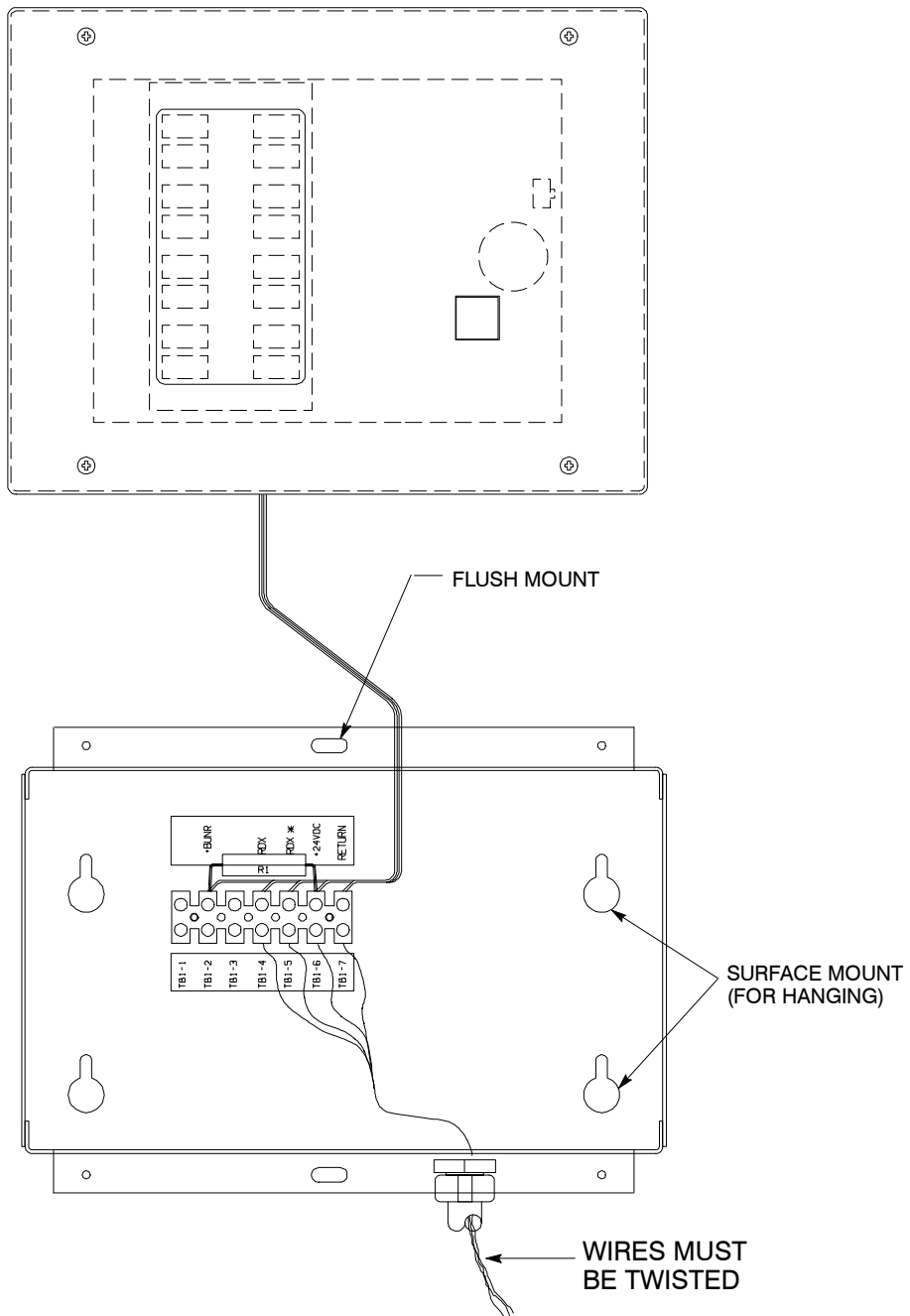


Figure 4-1. Remote Monitor Panel (RMP)

NOTE: Before installing an RMP, be sure you have prepared the SSBM according to the instructions in Chapter 2.

4.2 To install an RMP:

1. Securely mount the RMP(s).
2. Install wiring from the RMP using ½-in. conduit through the cable entry panels in the top of the SSBM control section (refer to the enclosed switchboard vendor drawings for the location of the conduit landing plate).
3. In the spare parts kit, locate the RMP adapter cable assembly (see Figure 4–2). Mate the DB–9 connector on the back of the terminal block to the DB–9 connector (Port 1) on the Customer Interface Panel of the SSBM (refer to Drawing 164201373–4 in Appendix A). Use two screws from the spare parts kit to secure the terminal block bracket to the Customer Interface Panel.

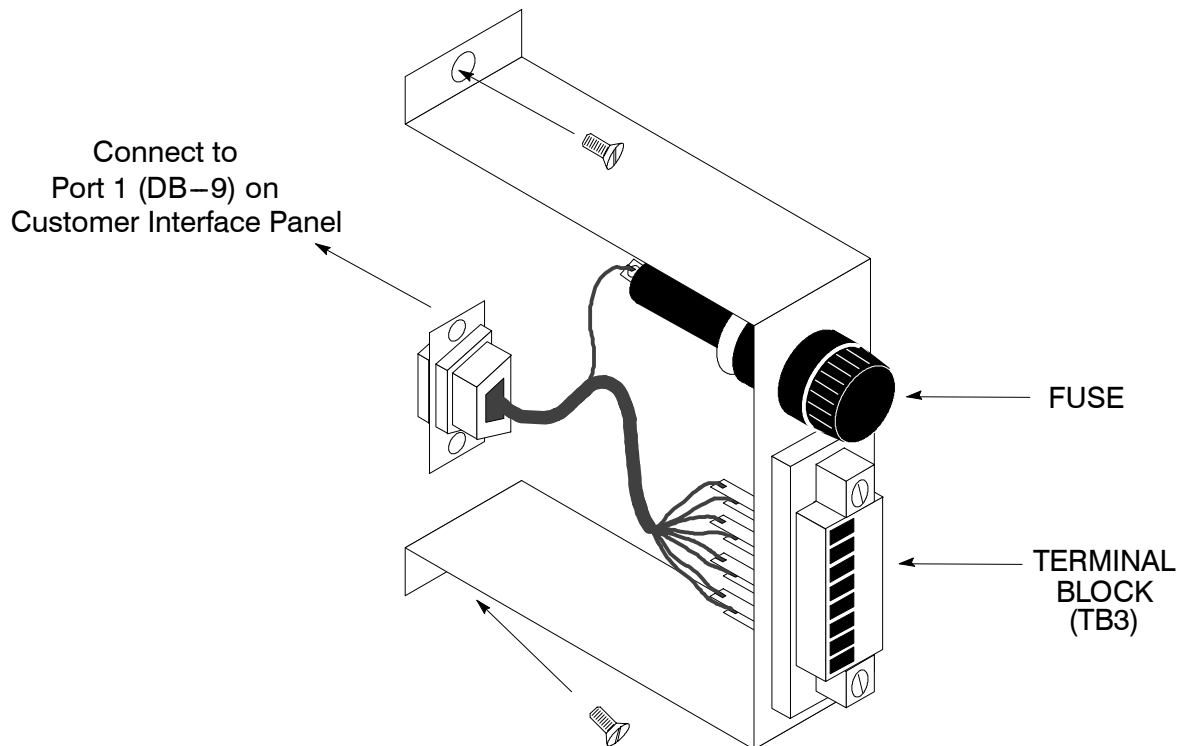


Figure 4–2. Terminal Block Bracket

4. Connect RMP wiring to the terminal block using terminations shown in Table 4–2.

Table 4–2. RMP Wire Terminations		
<i>From RMP A</i>	<i>To SSBM</i>	<i>Remarks</i>
TB1–4	TB3–1	TWISTED WIRES (4) 1–2 TURNS PER 3 INCHES
TB1–5	TB3–2	
TB1–6	TB3–3	
TB1–7	TB3–4	
<i>From RMP B (if used)</i>	<i>To SSBM</i>	<i>Remarks</i>
TB1–4	TB3–5	TWISTED WIRES (4) 1–2 TURNS PER 3 INCHES
TB1–5	TB3–6	
TB1–6	TB3–7	
TB1–7	TB3–8	

5. To check the operation of the RMP, ensure that the Parallel Capacity/Redundant system is supplying the load via the inverters or bypass. If the indicators on the RMP show the appropriate status, then it is operating correctly.

If the communications link between the SSBM and the RMP is not present, the RMP will self-test (all indicators flash and the horn beeps at one-second intervals). If this occurs, check all harness connectors and the fuse for proper seating. If all connections are secure but the RMP continues to self-test, replace the fuse with the spare included in the hardware kit. If this does not correct the problem, contact your local field service office for verification that the RMP is working correctly.

6. To test the indicator lamps, press the horn silence button and hold it for 3 seconds. All lamps should light, and the horn will sound continuously until you release the button.
7. Repeat steps 1, 2, and 4 through 6 for each RMP you are installing.
8. If you are installing an RIM or SCM in addition to an RMP, proceed to Chapter 5 or 6, respectively; otherwise, secure the SSBM by reversing the steps contained in procedure “To Prepare the SSBM for Wiring to an RMP, RIM, SCM, or Remote EPO” of Chapter 2.

Installing a Relay Interface Module

5

5.1 Installation Procedures

The optional Relay Interface Module (RIM) uses relay contact closures to indicate the operating status and alarm condition of the Parallel Capacity/Redundant system. The module uses an RS422 serial interface line and may support up to eight critical loads. A maximum of two monitoring accessories (RMPs, RIMs, or SCMs) can be installed. Refer to Chapter 4, Table 4–1 for the number of accessories permitted. Figure 5–1 shows the RIM with its four 15-pin connectors labeled J1 through J4. Drawing 164201373–9 in Appendix A outlines the enclosure dimensions.

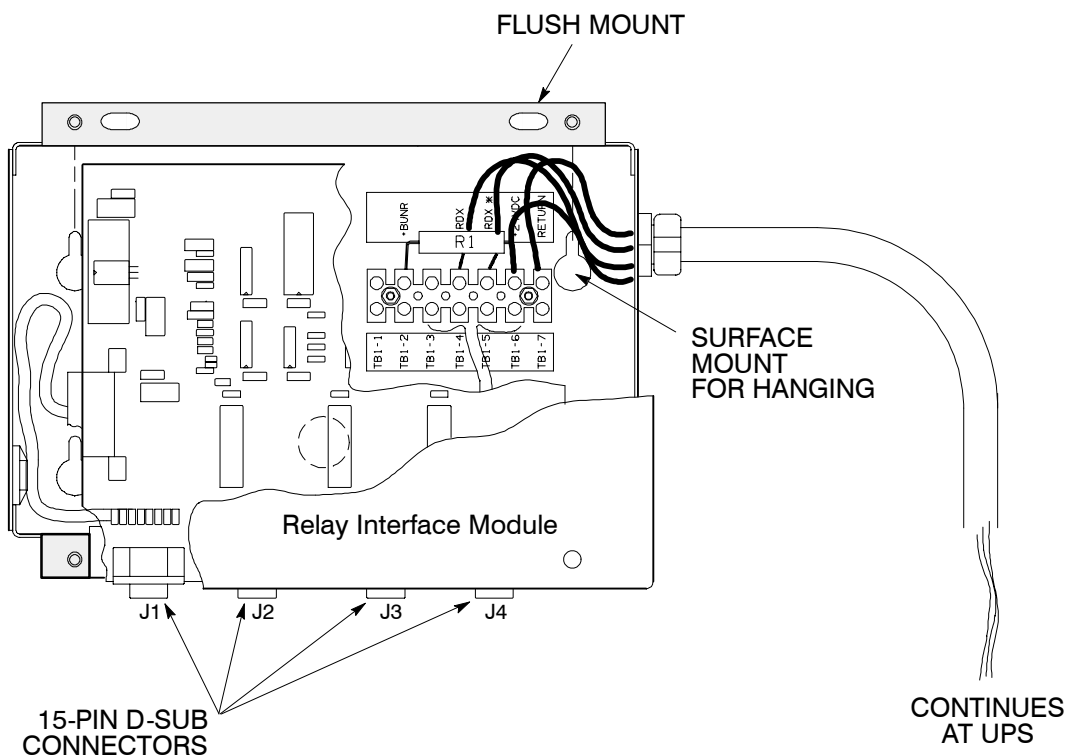


Figure 5–1. Relay Interface Module

NOTE: Before installing an RIM, be sure you have prepared the SSBM according to the instructions in Chapter 2.

5.2 To install a RIM:

1. Securely mount the RIM.
2. Install wiring from the RIM using ½-in. conduit through the cable entry panels in the top of the SSBM control section (refer to the enclosed switchboard vendor drawings for the location of the conduit landing plate).
3. If not already installed, locate the RMP adapter cable assembly (see Figure 5–2) in the spare parts kit. Mate the DB–9 connector on the back of the terminal block to the DB–9 connector (Port 1) on the Customer Interface Panel of the SSBM (refer to Drawing 164201373–4 in Appendix A). Use two screws from the spare parts kit to secure the terminal block bracket to the Customer Interface Panel.

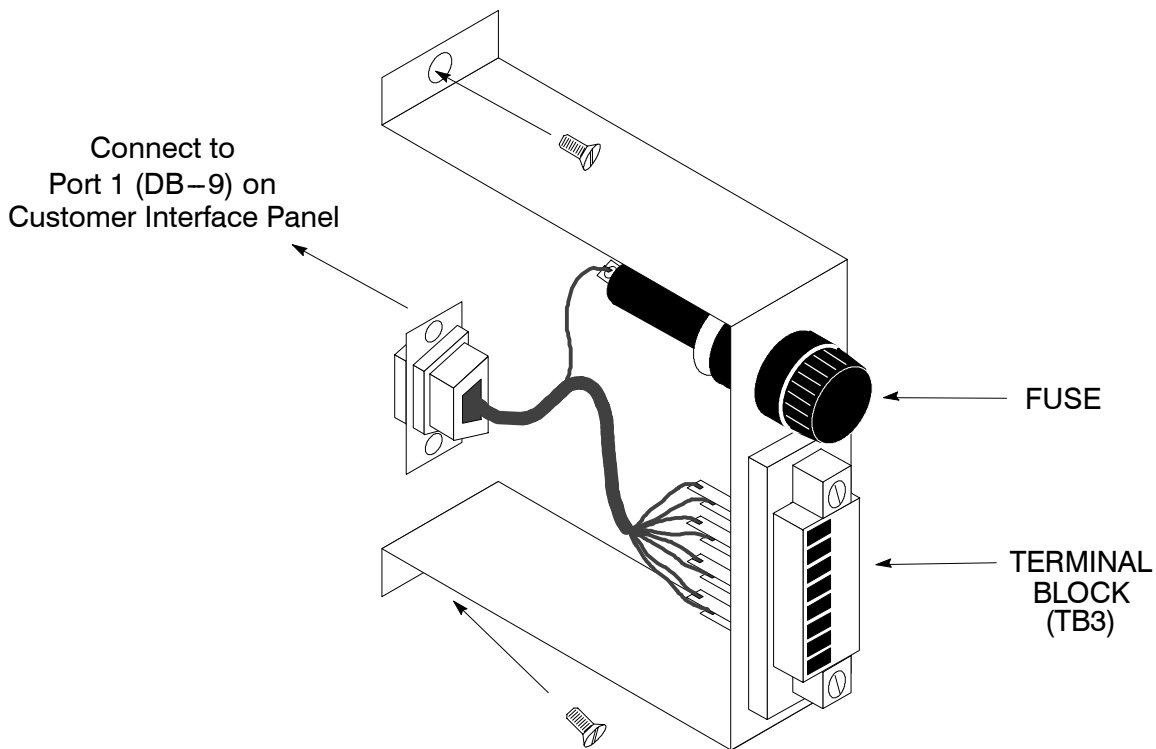


Figure 5–2. Terminal Block Bracket

4. Connect RIM wiring to the terminal block using the terminations shown in Table 5–1.

Table 5–1. RIM Wire Terminations		
<i>From RIM A</i>	<i>To SSBM</i>	<i>Remarks</i>
TB1–4	TB3–1	TWISTED WIRES (4) 1–2 TURNS PER 3 INCHES
TB1–5	TB3–2	
TB1–6	TB3–3	
TB1–7	TB3–4	
<i>From RIM B (if used)</i>	<i>To SSBM</i>	<i>Remarks</i>
TB1–4	TB3–5	TWISTED WIRES (4) 1–2 TURNS PER 3 INCHES
TB1–5	TB3–6	
TB1–6	TB3–7	
TB1–7	TB3–8	

5. Contact your local field service office for verification and testing of the RIM and its connections prior to making connections to J1–J4.

You can order interface cables separately for connecting to the 15-Pin D-Sub Connectors.

6. Repeat steps 1 through 5 for each RIM you are installing.
7. If you are installing an RMP or SCM in addition to an RIM, proceed to Chapter 4 or 6, respectively; otherwise, secure the SSBM by reversing the steps contained in procedure “To Prepare the SSBM for Wiring to an RMP, RIM, SCM, or Remote EPO” of Chapter 2.

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Installing a Supervisory Contact Module

6

6.1 Installation Procedures

The optional Supervisory Contact Module (SCM) as shown in Figure 6–1 provides contacts for monitoring Parallel Capacity/Redundant system status. A maximum of two monitoring accessories (RMPs, RIMs, or SCMs) can be installed. Refer to Chapter 4, Table 4–1 for the number of accessories permitted. See Drawing 164201373–10 in Appendix A for enclosure dimensions, side views, and knockout patterns.

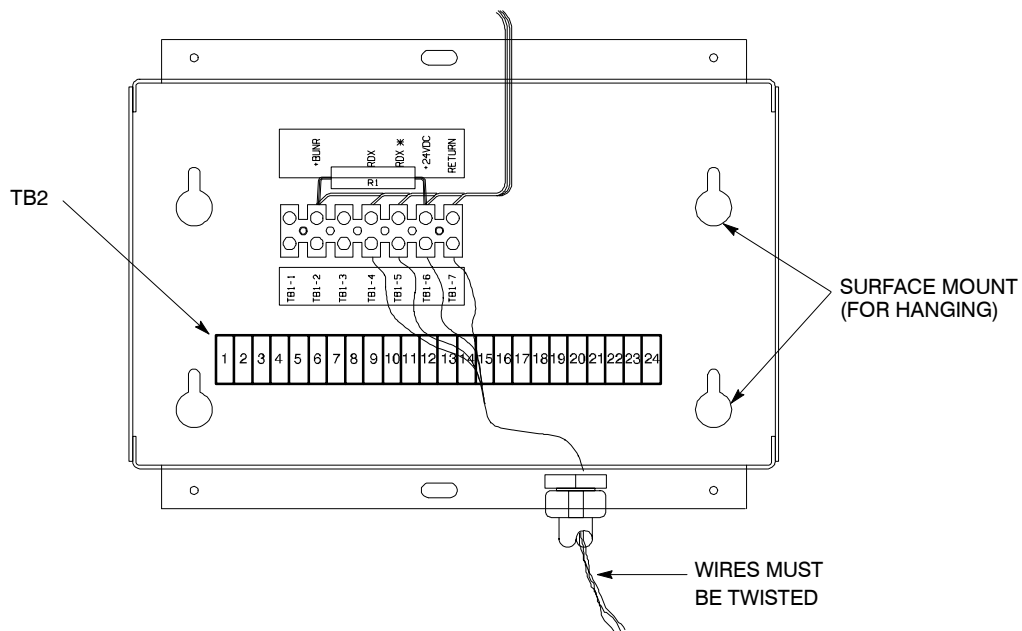


Figure 6–1. Supervisory Contact Module

NOTE: Before installing an SCM, be sure you have prepared the SSBM according to the instructions in Chapter 2.

6.2 To install a Supervisory Contact Module:

1. Securely mount the SCM.
2. Install wiring from the SCM using 1/2-in. conduit through the cable entry panels in the top of the SSBM control section (refer to the enclosed switchboard vendor drawings for the location of the conduit landing plate).
3. If not already installed, locate the RMP adapter cable assembly (see Figure 6–2) in the spare parts kit. Mate the DB–9 connector on the back of the terminal block to the DB–9 connector (Port 1) on the Customer Interface Panel of the SSBM (refer to Drawing 164201373–4 in Appendix A). Use two screws from the spare parts kit to secure the terminal block bracket to the Customer Interface Panel.

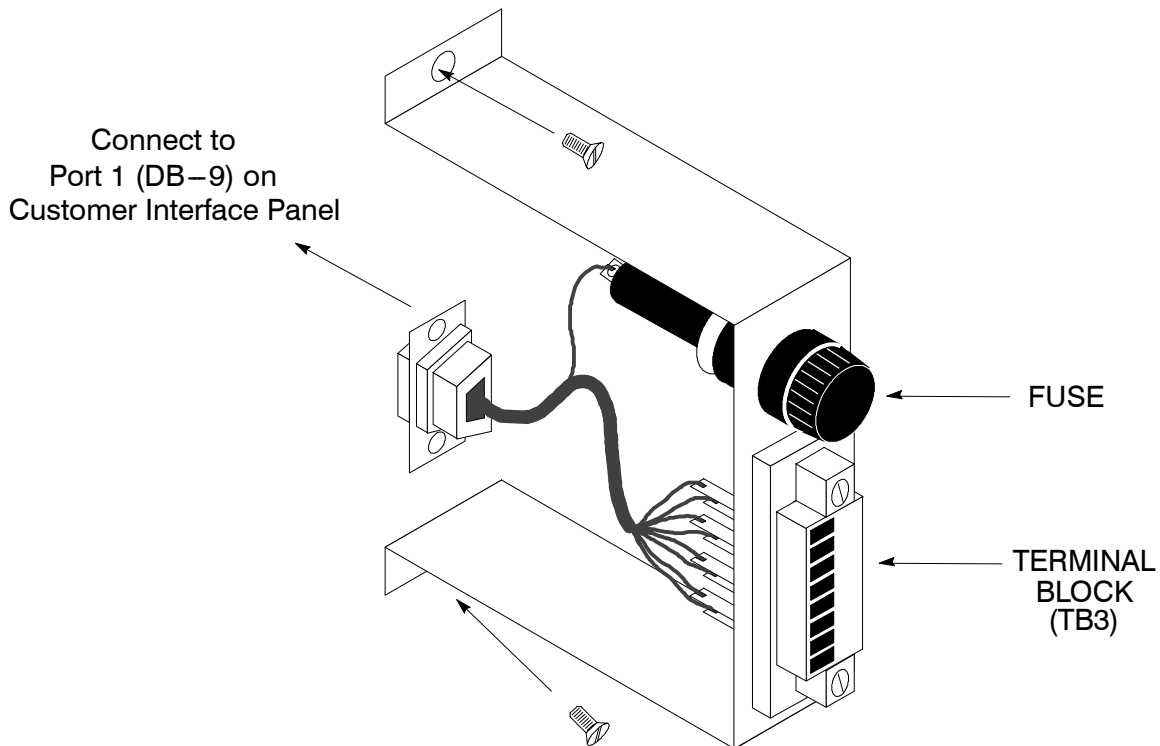
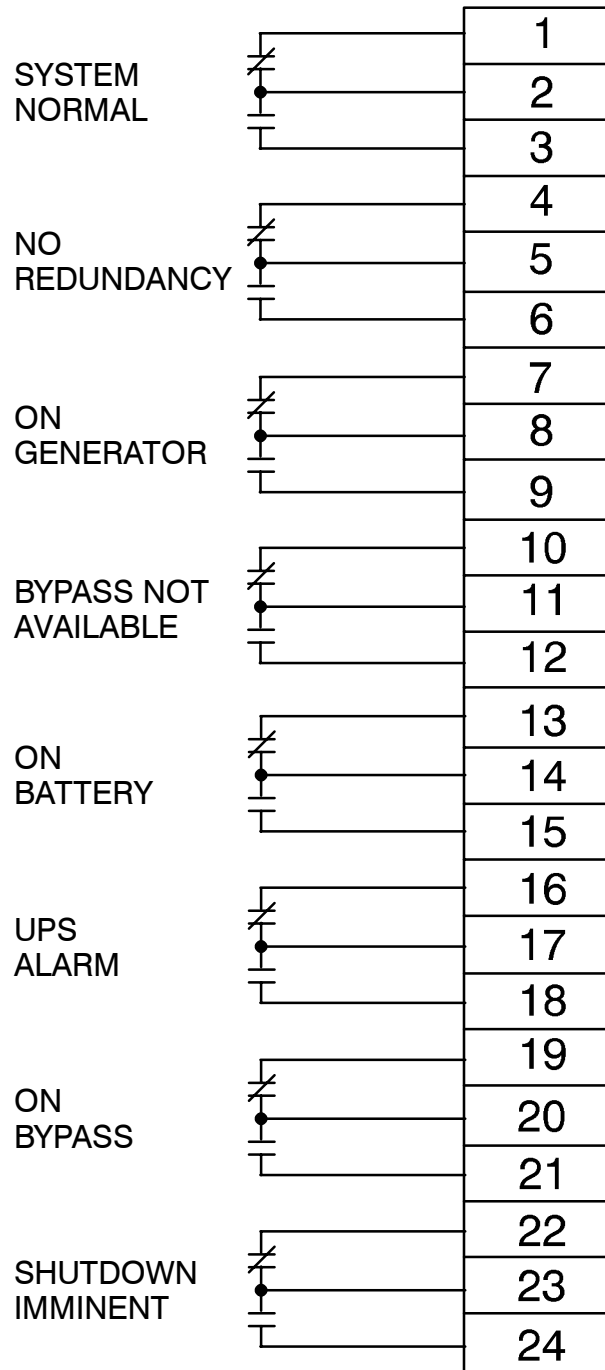


Figure 6–2. Terminal Block Bracket

4. Connect the SCM wiring to the terminal block using the terminations shown in Table 6–1.

Table 6–1. Supervisory Contact Module Wire Terminations		
<i>From SCM A</i>	<i>To SSBM</i>	<i>Remarks</i>
TB1–4	TB3–1	TWISTED WIRES (4) 1–2 TURNS PER 3 INCHES
TB1–5	TB3–2	
TB1–6	TB3–3	
TB1–7	TB3–4	
<i>From SCM B (if used)</i>	<i>To SSBM</i>	<i>Remarks</i>
TB1–4	TB3–5	TWISTED WIRES (4) 1–2 TURNS PER 3 INCHES
TB1–5	TB3–6	
TB1–6	TB3–7	
TB1–7	TB3–8	

5. Contact your local field service office for verification and testing of the SCM and its connections prior to making connections to terminal strip TB2 shown in Figures 6–1 and 6–3.
6. Repeat steps 1 through 5 for each SCM you are installing.
7. If you are installing an RMP or RIM in addition to an SCM, proceed to Chapter 4 or 5, respectively; otherwise, secure the SSBM by reversing the steps contained in procedure “To Prepare the SSBM for Wiring to an RMP, RIM, SCM, or Remote EPO” of Chapter 2.



Note: Supervisory contacts are rated at 2.0 amps at 28 Vdc or 120 Vac and 0.15 amp at 115 Vdc.

Supervisory contacts require external power supply. Internal 24 Vdc is not capable of supplying contact current.

Figure 6–3. Supervisory Contact Module TB2

Section II

Operation

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Understanding Parallel Capacity/Redundant System Operation



The Switchboard System Bypass Module (SSBM) supports the normal operation of the Powerware® 9315 Parallel Capacity/Redundant system by offering parallel capacity/redundant capability. The Parallel Capacity/Redundant system continues to maintain power to the critical loads during commercial electrical power brownout, blackout, overvoltage, undervoltage, and out-of-tolerance frequency conditions. Refer to Figure 164201373–3 in Appendix A of this manual for the detailed relationship of the SSBM and the UPMs.

If utility power is interrupted or falls outside the parameters specified in the *Powerware® 9315 Operation* manual, the Parallel Capacity/Redundant system uses a backup battery supply to sustain power to the critical load for a specified period of time or until the utility power returns. For extended power outages, the backup battery supply allows you to either transfer to an alternate power system (such as a generator) or shut down the critical load in an orderly manner. Refer to the *Powerware® 9315 Operation* manual provided with the UPMs for operation of the UPMs.

7.1 Looking Inside the Parallel Capacity/Redundant System

The output of the system is normally supplied by several Uninterruptible Power Modules (UPMs). Multiple UPMs are connected with their outputs in parallel to provide a load level greater than the rating of one UPM and for redundancy. The paralleled UPMs supply the output load with protected power as long as the load does not exceed the combined rating of the paralleled UPMs.

The power system is denoted redundant as long as one of the UPMs can be disconnected from the output bus and the remaining UPMs can continue to supply power to the load without exceeding their ratings.

The SSBM, contains switchgear and components that allow the the UPMs to be paralleled and the source of system output power to be transferred between Bypass and the paralleled UPMs.

When the load is being supplied by the UPMs, the system output bus is continuously monitored by the SSBM for an over or under voltage condition. If an out of limits condition is detected, the SSBM will transfer the load to bypass using a high speed emergency bypass. The transfer will occur in less than 4 milliseconds.

The emergency bypass consist of a static switch, a wraparound bypass breaker (CBP) and a backfeed protection breaker (FBP). The backfeed protection breaker is located in series with the static switch. If an SCR shorts, the breaker will open so that the UPMs will not backfeed the bypass source, dropping the load when a utility outage occurs.

During maintenance, the output of the system can be supplied power through the bypass breakers in the SSBM or the optional System Maintenance Bypass (SMB). The bypass input and breaker must be rated for the total system load since it must supply all of the system load when on bypass. Manual transfers between the bypass source and the paralleled UPMS are verified make before break.

Operations during transfers to bypass differ depending on the type of transfer: Manual or Emergency. Manual and Emergency transfers function as follows:

Fully Rated Static Switch:

For Manual transfers to bypass, the static switch is not used. During the transfer, CBP is closed and verified and then CBS is opened. For transfers of the load from bypass to the UPMS, CBS is closed and verified and then CBP is opened. The static switch is armed and ready during both types of transfers.

For Emergency transfers to bypass, the static switch is turned on. During the transfer, CBP is closed and verified and then CBS is opened. The static switch turns off after a set time delay which allows the CBP and CBS breakers to complete their transfer.

Communications is required between the SSBM and UPMS in the system for full system operation. System level communications and control are accomplished using a dual redundant network known as PowerNet. PowerNet consists of two independent networks that are connected to each component network node in the parallel system.

Data is always transmitted on both networks simultaneously. Each network node monitors both PowerNets. Failure of one of the two will only result in an alarm condition. In addition, the applications at each node are designed such that messages can be lost on the network without affecting the operation of the system.

7.2 Standard Modes of Parallel Operation: Normal, Battery, and Bypass Modes

With the Parallel Capacity/Redundant system, the system continues to function automatically to supply AC electrical power to the critical load. There are three standard operation modes:

- In *Normal* mode, Parallel Capacity/Redundant system functions normally, supplying clean, filtered power from the UPMs to the load.
- In *Bypass* mode, the SSBM bypass input supplies the load and isolates the UPMs.
- In *Battery* mode, the battery cabinet supplies DC power, which maintains UPM operation.

The following descriptions provide the Parallel Capacity/Redundant system operating mode differences.

7.2.1 Normal Mode

In Normal mode, utility AC power is supplied to the UPMs. Power from the output of the UPMs is then supplied to the SSBM for parallel operation. The SSBM then supplies the critical load with clean, filtered AC power. The message “System Normal” appears in the status area of the Control Panel LCD screen.

Figure 7–1 shows the path of electrical power through the Parallel Capacity/Redundant system when operating in Normal mode.

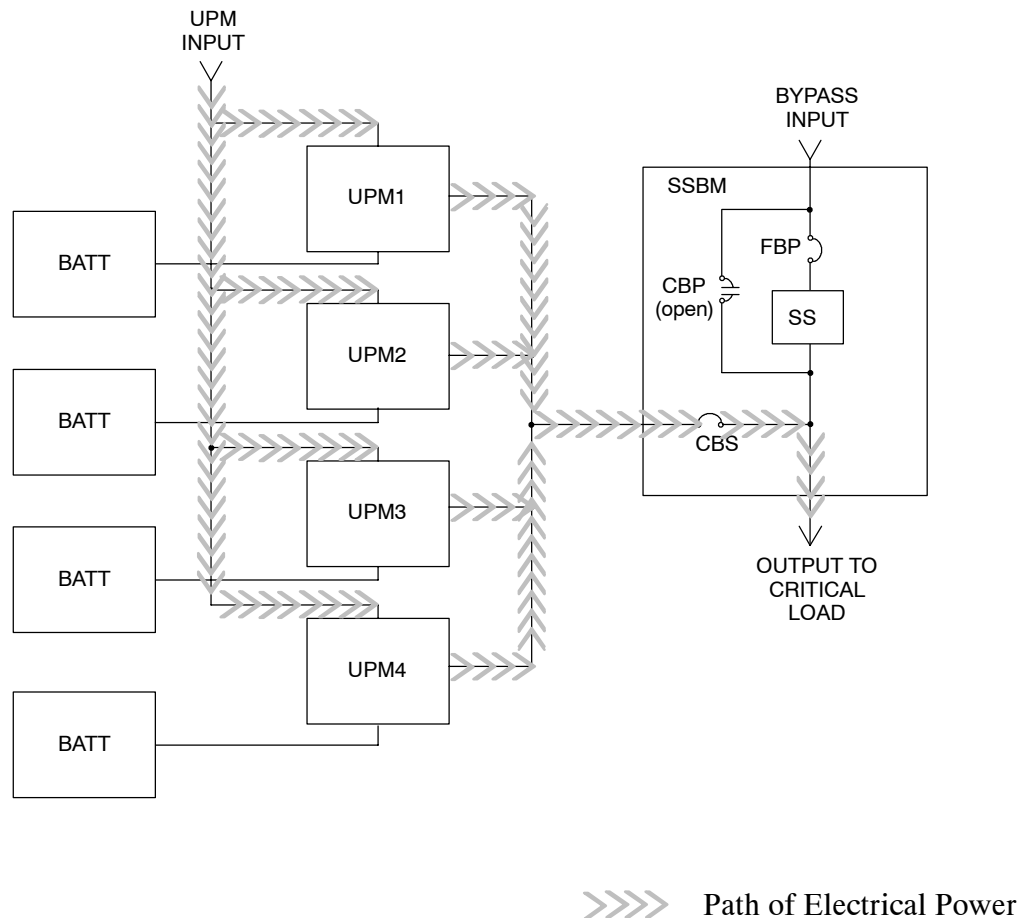


Figure 7–1. Path of Current Through the Parallel Capacity/Redundant System in Normal Mode.

If the utility AC power is interrupted or is out of specification, the UPMs automatically switch to Battery mode to support the critical load with no interruption. When utility power returns, the UPMs return to Normal mode.

If the UPMs becomes overloaded or unavailable, the SSBM switches to Bypass mode. The SSBM automatically returns to Normal mode when the error condition is cleared and system operation is restored within specified limits.

7.2.2 Bypass Mode

The SSBM automatically switches to Bypass mode if it detects a UPM overload, UPMs unavailable, load fault, or internal failure. The bypass source supplies the commercial AC power to the load directly.

CAUTION:
The critical load is not protected while the SSBM is in Bypass mode.

Figure 7–2 shows the path of electrical power through the Parallel Capacity/Redundant system when operating in Bypass mode.

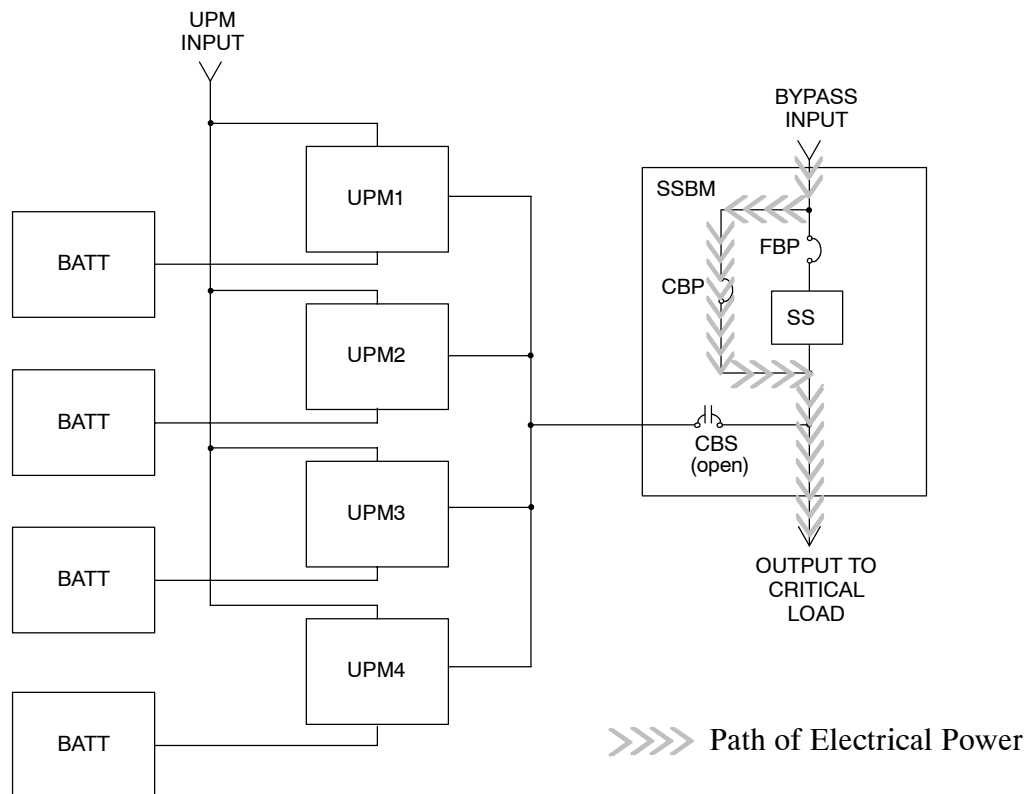


Figure 7–2. Path of Current Through the Parallel Capacity/Redundant System in Bypass Mode.

You can transfer the SSBM from Normal mode to Bypass mode manually. However, the SSBM switches automatically to Bypass mode whenever the UPMs can no longer supply the critical load. If the SSBM transfers to Bypass mode from Normal mode due to an output voltage deviation, the SSBM automatically attempts to transfer back to Normal mode (up to three times within a 10-minute period). The fourth transfer or an overload condition will lock the critical load on the bypass source and requires operator intervention to transfer.

Bypass mode is a normal operating mode, and not an alarm condition. However, if the SSBM is unable to return to Normal mode following an automatic transfer to Bypass mode, an alarm condition will be recorded.

7.2.3 Battery Mode

The UPMS transfers to Battery mode automatically if a utility power outage occurs, or if the utility power does not conform to specified parameters. In Battery mode, the batteries provide emergency DC power that the inverters convert to AC power. When the UPMS switch to Battery mode, the alarm indications depend on the cause and condition of the battery charge. The length of time the system can operate in Battery mode depends on loading and the battery supply capacity.

Figure 7–3 shows the path of electrical power through the Parallel Capacity/Redundant system when operating in Battery mode.

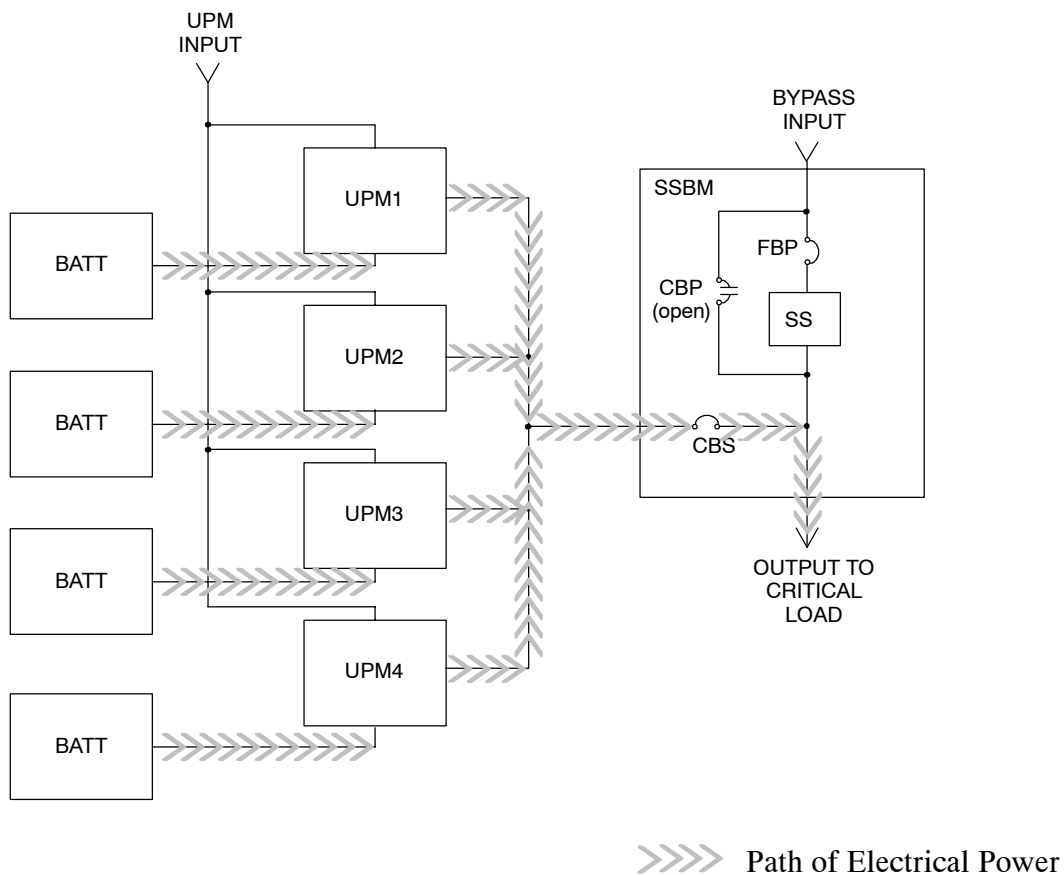


Figure 7–3. Path of Current Through the Parallel Capacity/Redundant System in Battery Mode

When the discharging battery voltage reaches the lower limit of UPM operational capability, the critical load is transferred by the SSBM to Bypass mode, if it is available. If Bypass input is not available, a “Shutdown Imminent” warning occurs. The warning time before critical load loss occurs is approximately 2 minutes, depending on battery capacity and the amount of loading.

If incoming power returns to within specified parameters, the UPMS automatically return to Normal mode and alarm indications clear. However, the process of returning to Normal mode is not instantaneous. The UPMS gradually draw increasing power from the incoming utility until Normal mode is achieved.

7.2.4 Load Bank Mode

The SSBM and SSBM with SMB are both equipped with Load Bank Tabs for the connection of a temporary load bank.

The Load Bank Tabs allow load testing to be performed on the UPMs or Bypass input portion of the SSBM or SSBM with SMB.

The SSBM comes standard with temporary Load Bank tabs only.

Figure 7–4 shows the path of electrical power through an SSBM in Load Bank Mode with Load Bank tabs connected to a temporary Load Bank. Only UPM1 is shown under testing.

Figure 7–5 shows the path of electrical power through an SSBM with SMB in Load Bank mode with Load Bank Tabs when connected to a temporary Load Bank. The SMB is in Maintenance Bypass mode carrying the Critical Load while UPM1 is shown under testing.

WARNING:

During testing, cables connecting the temporary load bank to the load bank tabs will have to exit the SSBM or SSBM with SMB via an open rear door. With the rear door open, personnel are exposed to energized buswork. To prevent injury from electrical shock, temporary barriers and warning signs should be established.

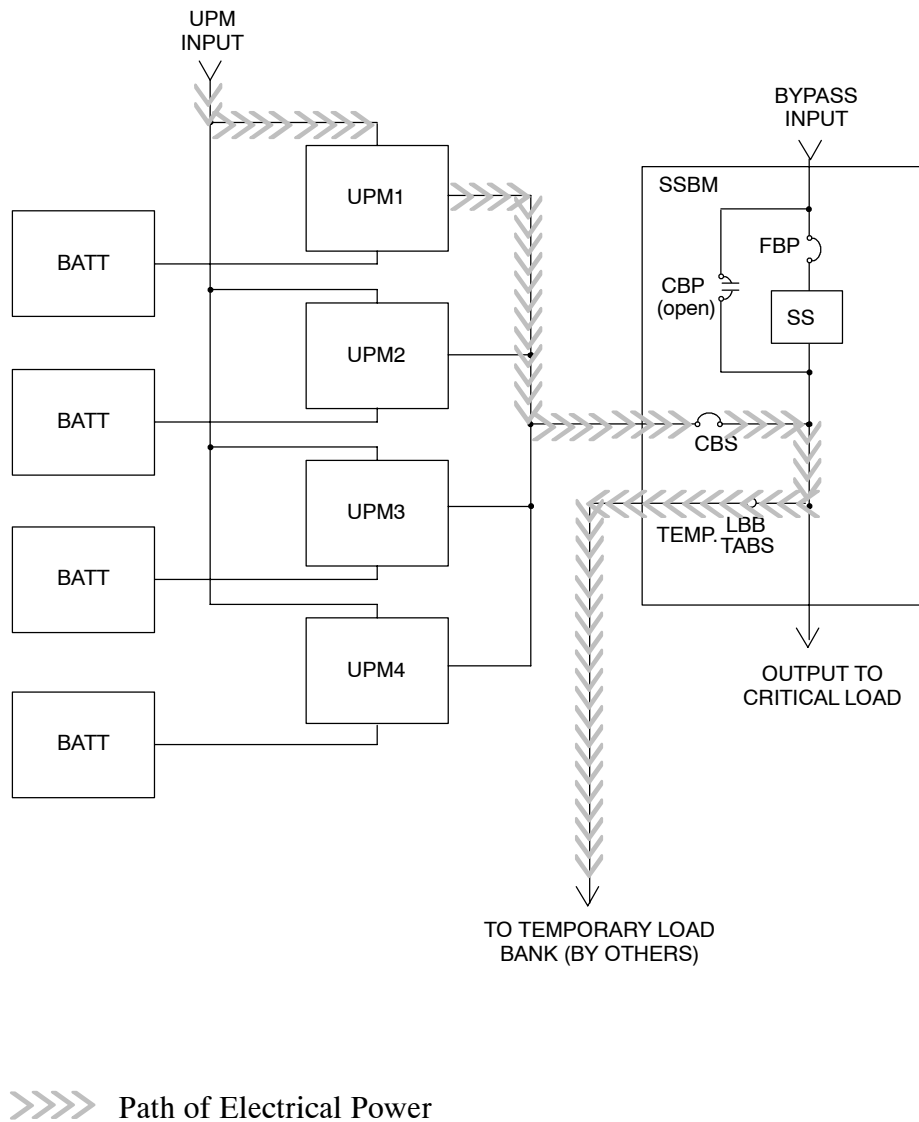


Figure 7-4. Path of Current Through the Parallel Capacity/Redundant System in Load Bank Mode with SSBM with Temporary Load Bank Tabs.

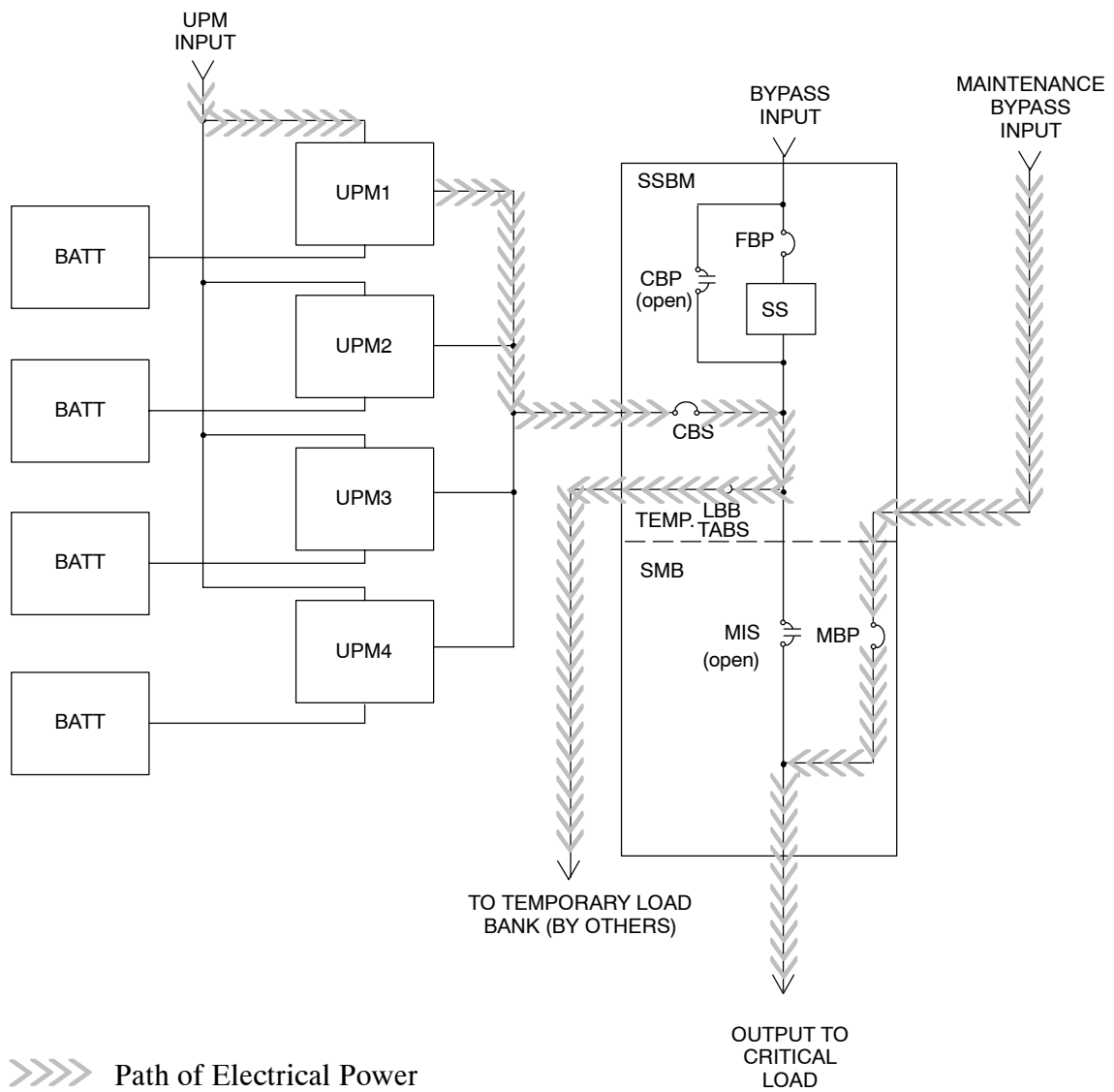


Figure 7–5. Path of Current Through the Parallel Capacity/Redundant System in Load Bank Mode with SSBM/SMB with Temporary Load Bank Tabs.

7.3 Optional Modes of Parallel Operation: Maintenance Bypass and Redundant CBP

There are two optional modes of operation in this Parallel Capacity/Redundant system:

- In *Maintenance Bypass* mode (optional), the SMB bypass supplies the load and isolates the SSBM and UPMs for maintenance purposes.
- In *Redundant CBP* mode (optional), if the CBP breaker fails to close during a manual or automatic operation, the SSBM automatically closes the MBP breaker to maintain power to the critical load.

The following descriptions provide the Parallel Capacity/Redundant system optional operating mode differences.

7.3.1 Maintenance Bypass Mode (Optional)

The Parallel Capacity/Redundant system can be manually transferred to maintenance bypass if the System Maintenance Bypass (SMB) has been provided. Maintenance bypass is used when the system is not operating or is in need of service. The maintenance bypass source supplies the commercial AC power to the load directly. The SMB is configured with electrical interlocks.

CAUTION:
The critical load is not protected while the Parallel Capacity/Redundant system is in Maintenance Bypass mode.

Figure 7–6 shows the path of electrical power through the Parallel Capacity/Redundant system when operating in Maintenance Bypass mode.

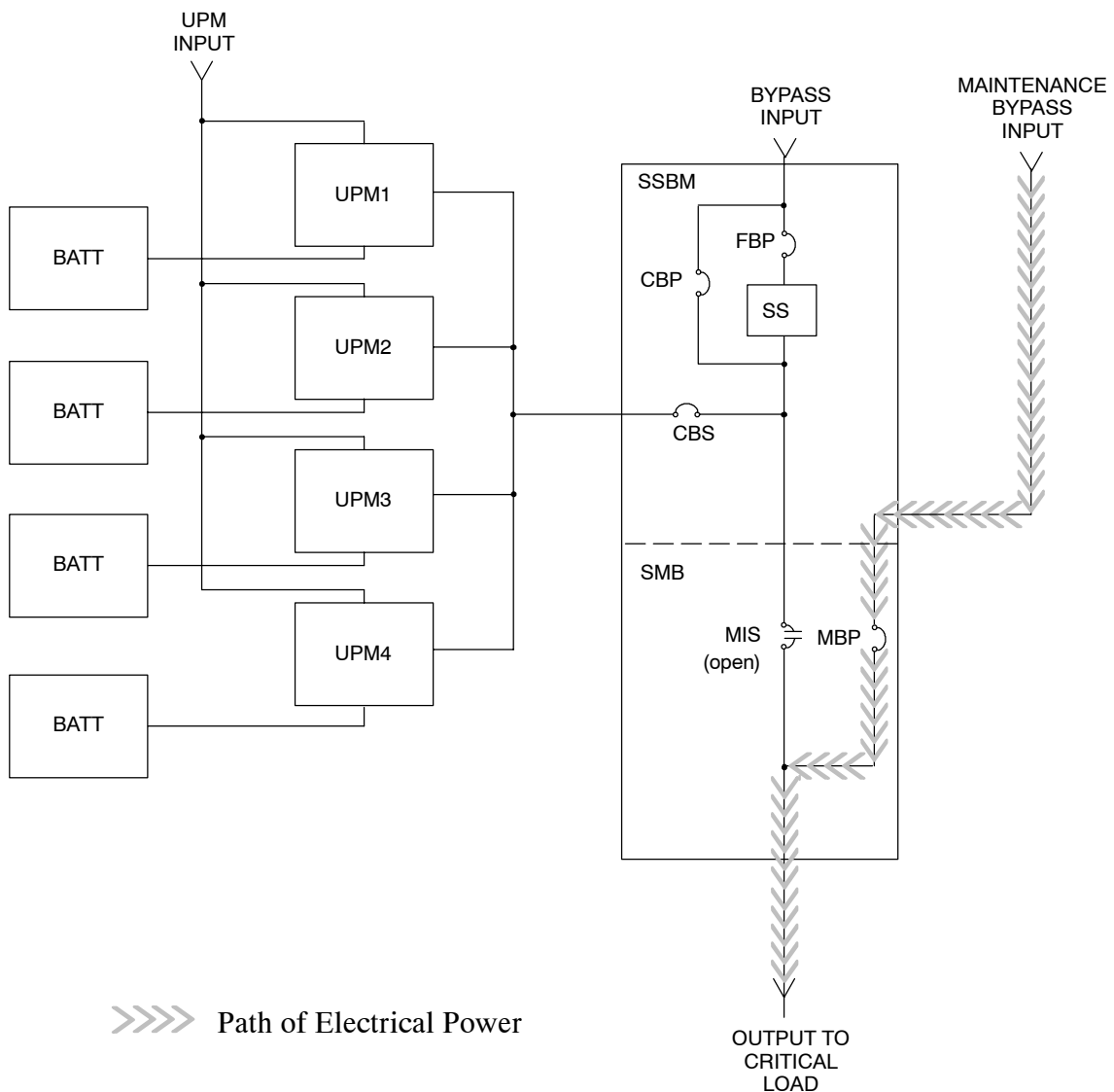


Figure 7–6. Path of Current Through the Parallel Capacity/Redundant System in Maintenance Bypass Mode.

7.3.2 Redundant CBP Mode (Optional)

The Parallel Capacity/Redundant system can be protected against failure of the CBP breaker to close if an electrically interlocked System Maintenance Bypass (SMB) with Redundant CBP controls has been provided. The Redundant CBP controls protect the critical load against power losses caused by CBP close failures during manual or automatic operations.

Redundant CBP operations can be recognized by an alarm condition at the SSBM and the following breaker conditions:

CBP	OPEN
CBS	OPEN
FBP	OPEN
MIS	CLOSED
MBP	CLOSED

<p style="text-align: center;">CAUTION: The critical load is not protected while the Parallel Capacity/Redundant system is in Maintenance Bypass or Bypass mode.</p>
--

Once Redundant CBP operation has occurred, the SSBM must be isolated to allow CBP breaker maintenance without impact on the system's critical load. To achieve SSBM isolation, the Redundant CBP controls have been interlocked with the System Maintenance Bypass controls. To exit from Redundant CBP operation, the SMB control switch must be turned to the **TO MAINT** position. This action opens the UPS system MIS breaker and places the the UPS system fully into Maintenance Bypass mode.

After the CBP breaker has been repaired, the UPS system can be transferred from Maintenance Bypass mode to Bypass mode as described above.

Figure 7–7 shows the path of electrical power through the Parallel Capacity/Redundant system when operating in Maintenance Bypass mode.

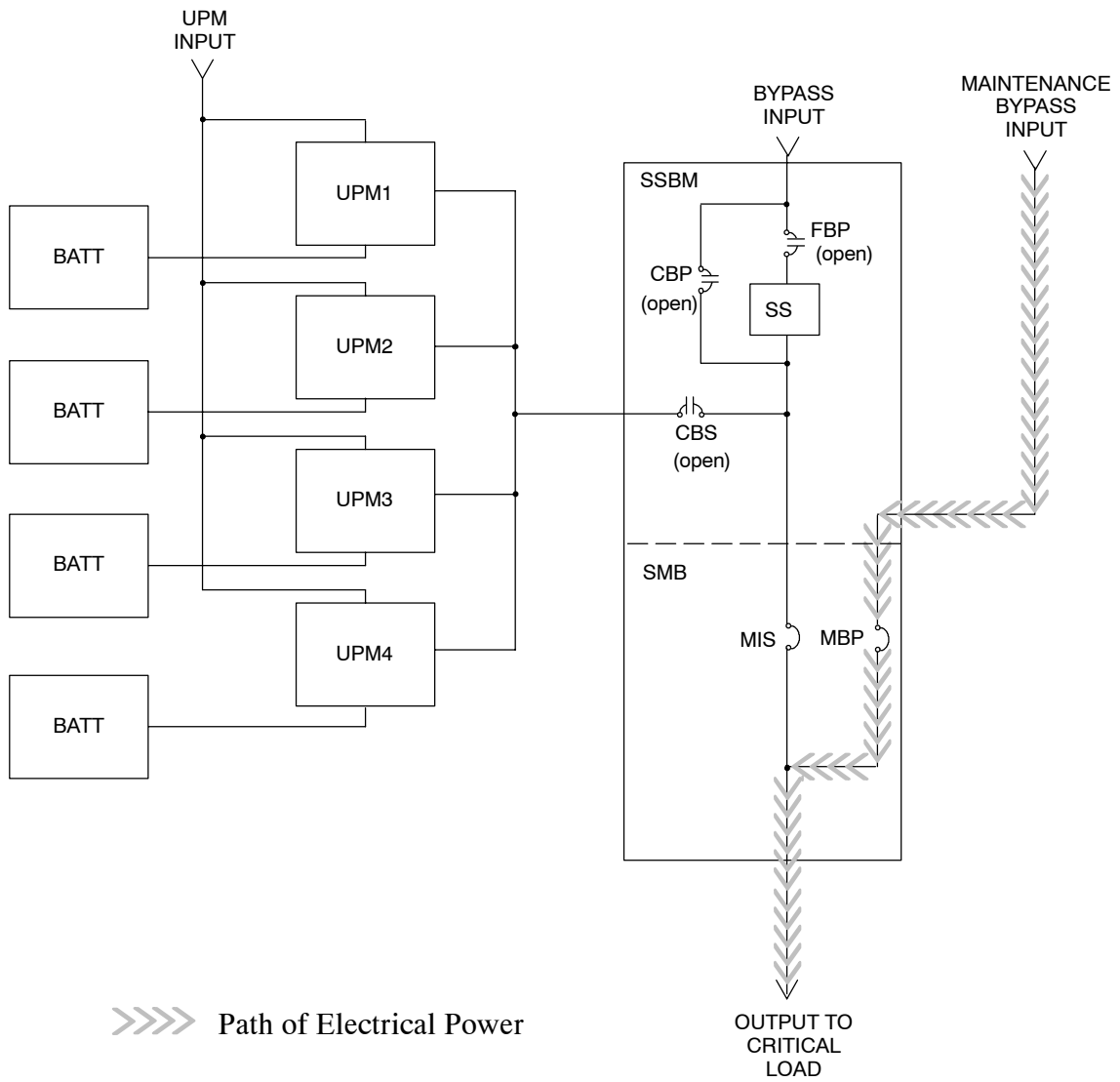
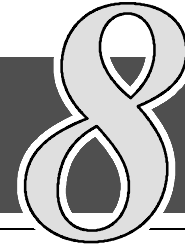


Figure 7–7. Path of Current Through the Parallel Capacity/Redundant System in Redundant CBP Mode.

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Operational Controls and Features



8.1 General

The Parallel Capacity/Redundant system should function automatically and require very little attention during normal operation. The controls and indicators identified in this section are used during startup, to monitor normal operation and during abnormal events.

Figure 8–1 (sheets 1 thru 4) identify and show the location of the controls and indicators on the typical Switchboard System Bypass Module (SSBM) control section. The following descriptions provide a brief overview of the SSBM controls, and standard and optional features.

NOTE: *Read the Operation section and have thorough knowledge of Parallel Capacity/Redundant operation before attempting to operate. For a more detailed description of UPS operation, refer to Powerware® 9315 Operation manual supplied with the UPS system.*

8.2 SSBM Standard Features

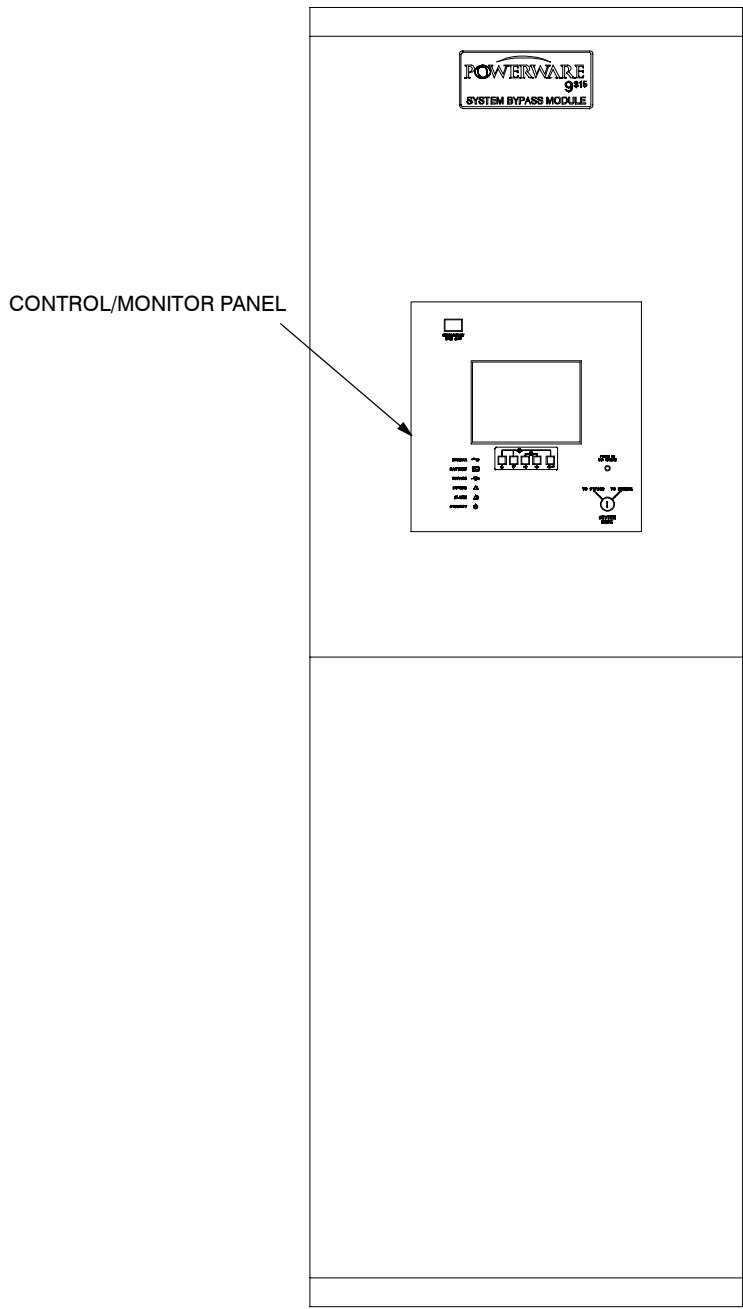
The SSBM has many standard features that provide cost-effective and consistently reliable power protection:

8.2.1 Control Panel

The *Control Panel* on the front of the SSBM control section contains an LCD screen to display the current status of the Parallel Capacity/Redundant system. You can view a statistical history and log of system events and display a real-time graphic representation of power flowing through the system components. Backlit status indicators show the operating mode of the SSBM and alert you to system events. The **SYSTEM MODE** switch, also located on this panel, is used to start and stop the system and transfer the load between normal UPM operation and bypass operation. The **EMERGENCY UPM OFF** pushbutton is located at the top of the control panel, and the **PUSH IN TO RESET** button for **EMERGENCY UPM OFF** is located above the **SYSTEM MODE** switch. The Control Panel is described in chapter 9, “Using the Control Panel”.

8.2.2 SSBM Circuit Breakers

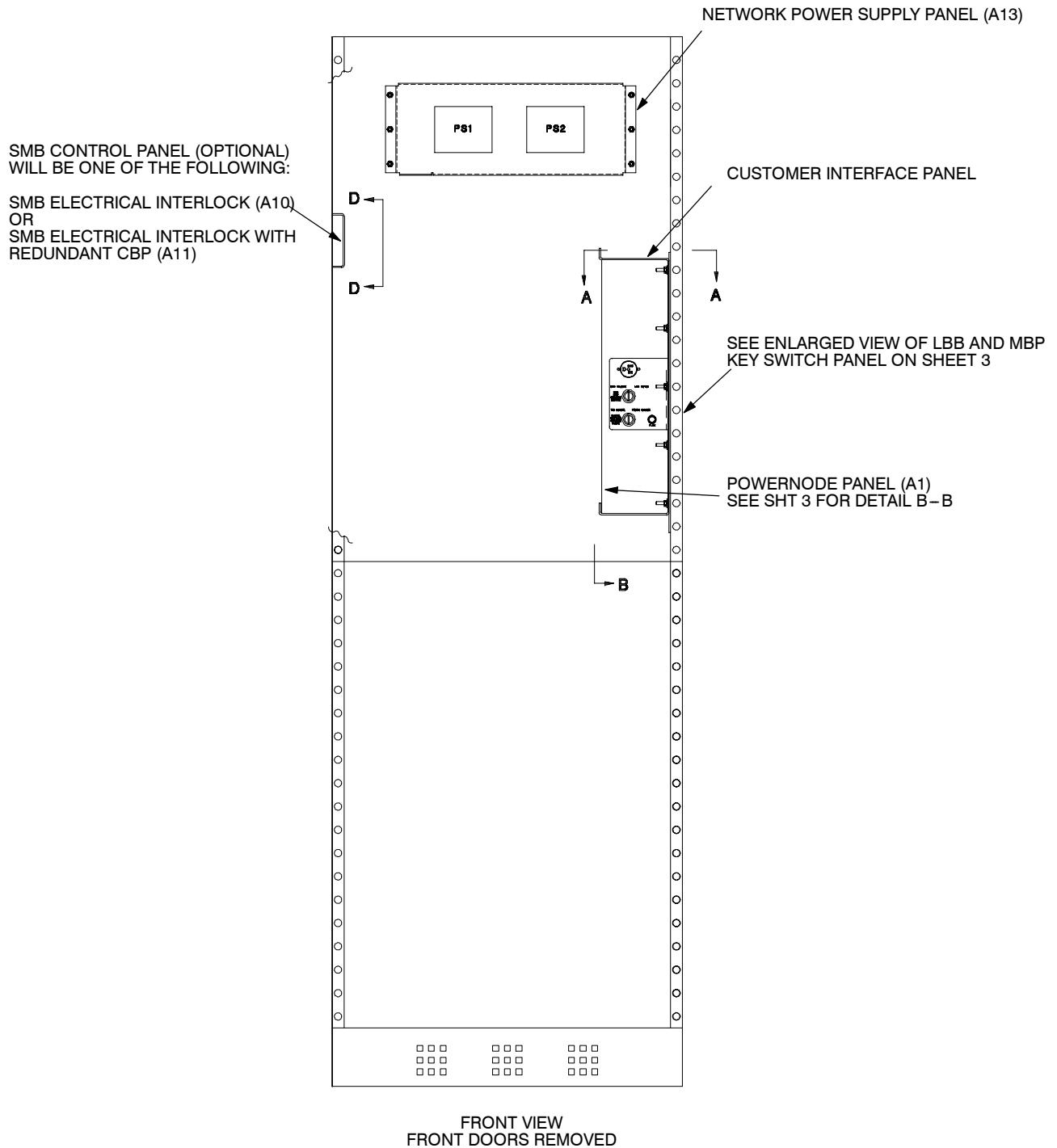
The SSBM contains three circuit breakers, the System Output Breaker (CBS), the System Bypass Breaker (CBP), and the Backfeed Protection Breaker (FBP). CBS connects the output of the UPMs to the critical load. CBP is used as the bypass supply in the event the output of the UPMs are not available and to supply the critical load during maintenance. FBP is used to prevent power from being fed back to the UPMs in the event the static switch fails. These breakers are electrically controlled by the SSBM and are automatic in operation.



FRONT VIEW

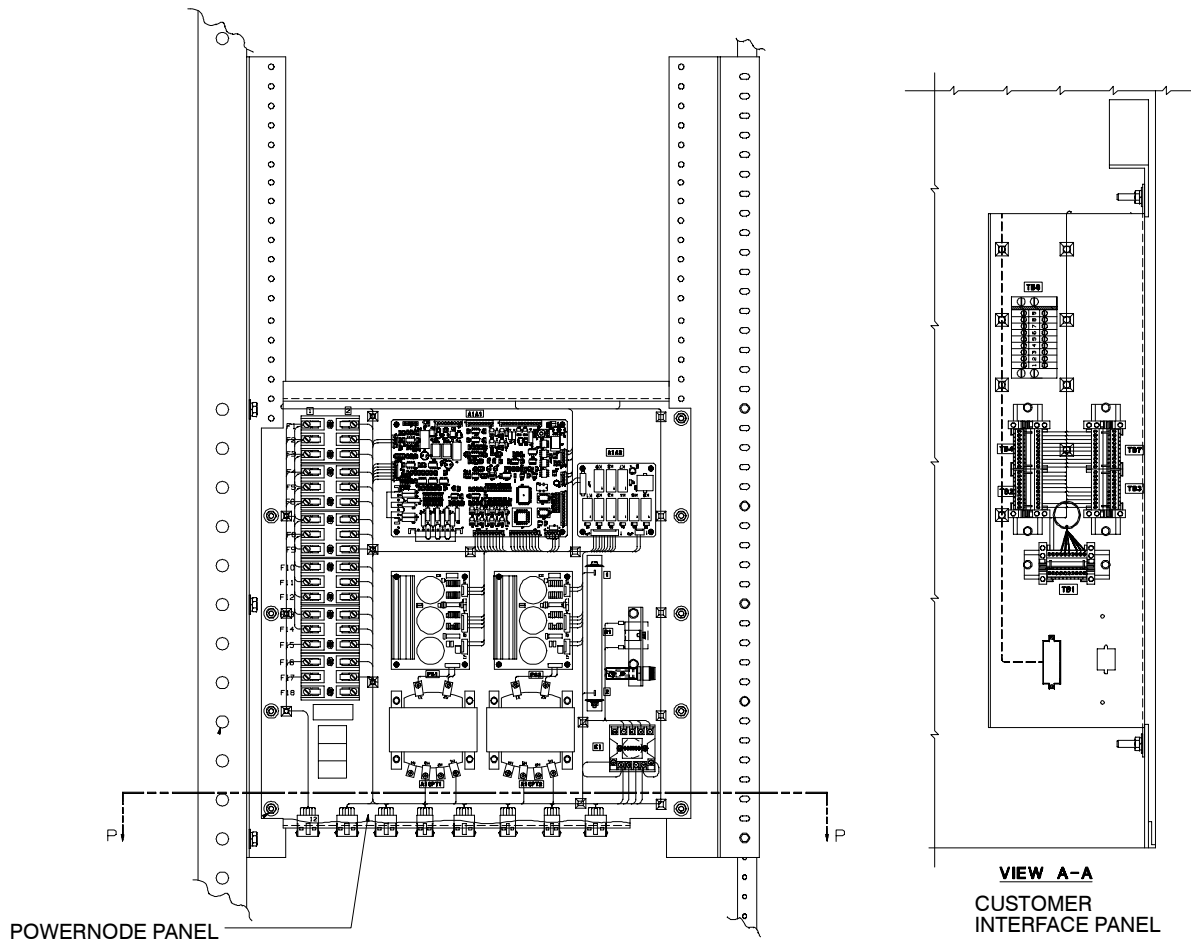
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Figure 8–1. Typical SSBM Control Section (Sheet 1 of 4)



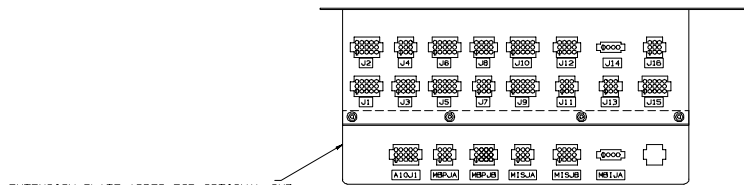
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Figure 8-1. Typical SSBM Control Section (Sheet 2 of 4)



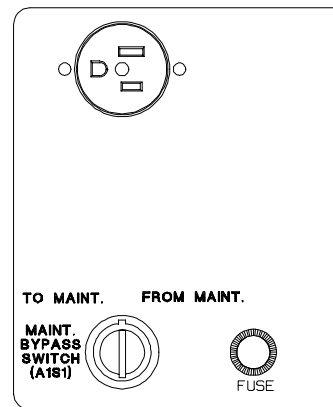
**VIEW B-B SHOWING
POWERNODE PANEL (A1) MOUNTED**

**VIEW A-A
CUSTOMER
INTERFACE PANEL**



EXTENSION PLATE ADDED FOR OPTIONAL SMB

**VIEW IN DIRECTION P-P
(SHOWING ALL M-N-L CAPS)**

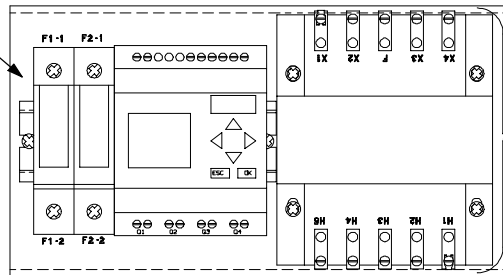


**ENLARGED VIEW OF
MAINT. BYPASS KEY SWITCH PANEL
(OPTIONAL)**

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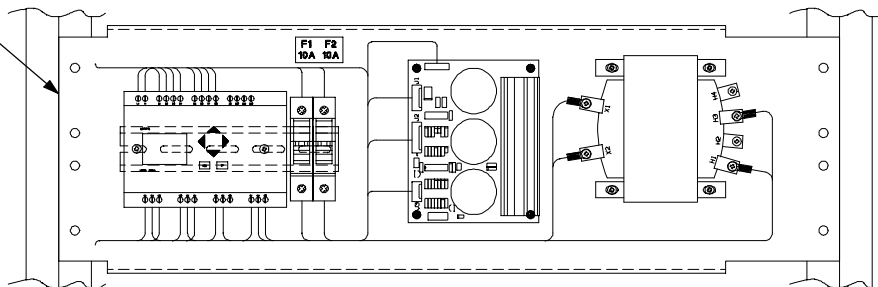
Figure 8-1. Typical SSBM Control Section (Sheet 3 of 4)

SMB ELECTRICAL INTERLOCK
PANEL (A10) (OPTIONAL)



ENLARGED VIEW
VIEW D-D

SMB ELECTRICAL INTERLOCK
PANEL (A11) WITH REDUNDANT CBP
CONTROLS (OPTIONAL)



ENLARGED VIEW
VIEW D-D

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Figure 8–1. Typical SSBM Control Section (Sheet 4 of 4)

8.2.3 SMB Circuit Breakers

The System Maintenance Bypass (SMB) contains two breakers: the Maintenance Bypass Breaker (MBP) and the Maintenance Isolation Breaker (MIS). The MIS connects the output of the UPMs to the critical load via CBS. The MBP is used as the bypass in the event the output of the SSBM is not available and to supply the critical load during SSBM maintenance. These breakers are manually controlled through electrical interlocks which include a control switch mounted inside the Control Section on the A1 Panel.

8.2.4 Fully Rated Static Switch

The fully rated static switch is connected in series with the FBP and is only gated on during emergency transfers from Normal to Bypass mode. The fully rated static switch is electrically controlled by the SSBM and is automatic in operation.

8.2.5 EMERGENCY UPM OFF

An **EMERGENCY UPM OFF** pushbutton is provided for situations where you must instantaneously control the UPM and SSBM output. The pushbutton is located on the front of the SSBM for quick access and is covered with a clear plastic shield to prevent inadvertent operation. The shield must be raised before pressing the pushbutton. The **EMERGENCY UPM OFF** pushbutton is described in detail in Chapter 10, "Operating Instructions for the Parallel Capacity/Redundant System."

8.2.6 Customer Interface Panel

PowerNet

Two redundant control networks connect UPM to UPM and UPM to the SSBM. Each network requires only one shielded twisted pair of wires. Refer to Appendix A, drawing 164201335-4 for further information.

Computer Interface

Two serial communications ports are standard on all units, and are electrically isolated from the SSBM. You can use these ports to link the SSBM to the features described in Chapter 13, "Serial Communications" and Chapter 14, "Remote Notification."

Summary Alarm Contacts

Alarm contacts are provided for connection to equipment at your facility, such as a light, an audible alarm, or a computer terminal. The equipment you connect to these contacts alerts you to an SSBM alarm. This feature is described further in Chapter 11, "Using Features and Options."

Building Alarm Monitoring

You can connect your facility's alarm system contacts to six inputs in the SSBM. The SSBM uses these inputs to monitor your building alarms in addition to the SSBM status. This feature is described further in Chapter 11, "Using Features and Options."

8.2.7 Customer Convenience Outlet

An uninterruptible 120VAC, 0.2 amp, fuse-protected convenience outlet is provided to supply power to the optional modem. It is located adjacent to the Customer Interface Panel.

8.2.8 Installation Features

Power wiring can be routed through the top or bottom of each cabinet. External sensing and monitoring control wire must be installed in accordance with Class 1 wiring methods. Class 1 wiring can be routed through the top or bottom of each cabinet.

8.3 Options and Accessories

Contact your sales representative for information about any of these available options:

8.3.1 Remote Monitor Panel

An optional *Remote Monitor Panel (RMP)* contains backlit status indicators and a local horn, allowing you to monitor the operational status and alarm condition of the SSBM from virtually any location within your facility. You can install multiple RMPs at remote locations to increase your monitoring capabilities. This option is described further in Chapter 11, “Using Features and Options.”

8.3.2 Relay Interface Module

An optional *Relay Interface Module (RIM)* uses relay contact closures to indicate the operating status and alarm condition of the SSBM. The module uses a serial interface line and may support up to eight critical loads. This option is described further in Chapter 11, “Using Features and Options.”

8.3.3 Modem

An optional modem is available for use with the Remote Notification feature described in Chapter 14, “Remote Notification”. Refer to the manual supplied with the modem for modem operating instructions.

8.3.4 ModBus Cards

The Powerware ModBus Card is an optional X–Slot connectivity device that allows you to continuously and reliably monitor the UPS system in your Building Management System (BMS). See Powerware ModBus Card User Guide 164201376, and Powerware Expansion Chassis User Guide, 164201336 for details.

8.4 Safety Considerations

The Parallel Capacity/Redundant system enclosures are designed for industrial or computer room applications, and contain safety shields. However, the system is very sophisticated and should be handled with appropriate care, following these guidelines:

- **Keep surroundings clean and free from excess moisture.**
- **Do not operate the system close to gas or electric heat sources.**
- **The system is not intended for outdoor use.**
- **The system operating environment should be maintained within the parameters stated in this manual.**
- **Keep the system doors closed to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit.**
- **The system contains its own power source. Lethal voltages are present even when the system is disconnected from utility power.**

<p style="text-align: center;">WARNING: Only AUTHORIZED SERVICE PERSONNEL should perform service or maintenance on the Parallel Capacity/Redundant system.</p>

If service or routine maintenance is required:

- **Ensure all power is disconnected before performing installation or service.**
- **Ensure the area around the Parallel Capacity/Redundant system is clean and uncluttered.**
- **Battery cabinet maintenance or battery replacement should be performed only by authorized service personnel.**
- **Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.**
- **Always conform to the more detailed safety precautions described in “Important Safety Instructions” section of Chapter 15.**

8.5 Symbols, Controls, and Indicators

These symbols may appear on your UPS system or on labels inside the UPS. They are accepted by most international safety agents. Everyone in your organization who works with your system should understand the meaning of these symbols:



ON

The principal power switch is in the “On” position.



OFF

The principal power switch is in the “Off” position.



PHASE

The word “phase.”



CAUTION: REFER TO MANUAL

Stop and refer to the Operator’s Manual for more information.



RISK OF ELECTRIC SHOCK

There is a risk of electric shock present, and you should observe associated warnings. The UPS contains high voltages.

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9.1 Description

This chapter describes the Switchboard System Bypass Module (SSBM) Control Panel, including controls and indicators, and how to monitor Parallel for Capacity/Redundant operation. The Control Panel is a black square area on the front of the SSBM control section (see Figure 9–1).

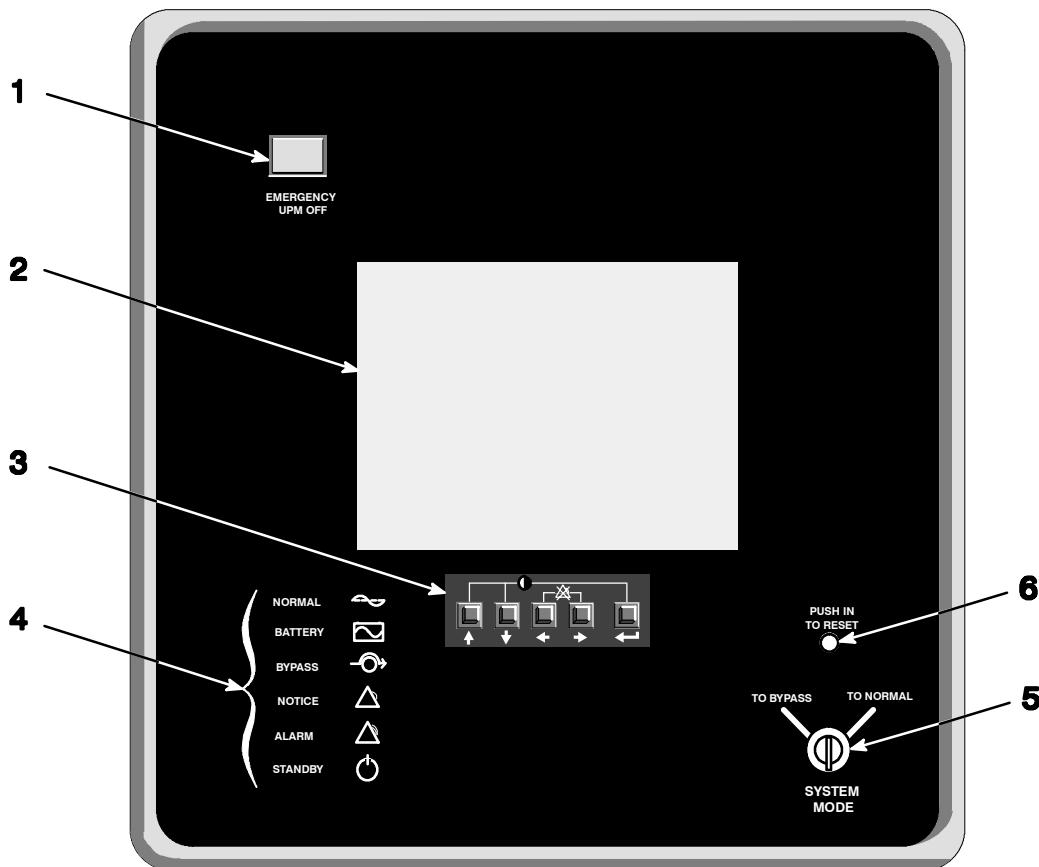


Figure 9–1. Parallel/Capacity Control Panel

The Control Panel contains

- (1) a red **EMERGENCY UPM OFF** pushbutton,
- (2) a flat liquid crystal display (LCD) screen,
- (3) a horizontal row of pushbuttons,
- (4) a vertical column of backlit status indicators,
- (5) a **SYSTEM MODE** key switch,
- (6) a **PUSH IN TO RESET** pushbutton.

The following sections describe the Monitor Panel in detail.

9.2 Using the LCD Screen

The LCD screen at the top of the Control Panel provides an operator interface with the Parallel Capacity/Redundant system. Figure 9–2 identifies the display fields discussed in the following sections.

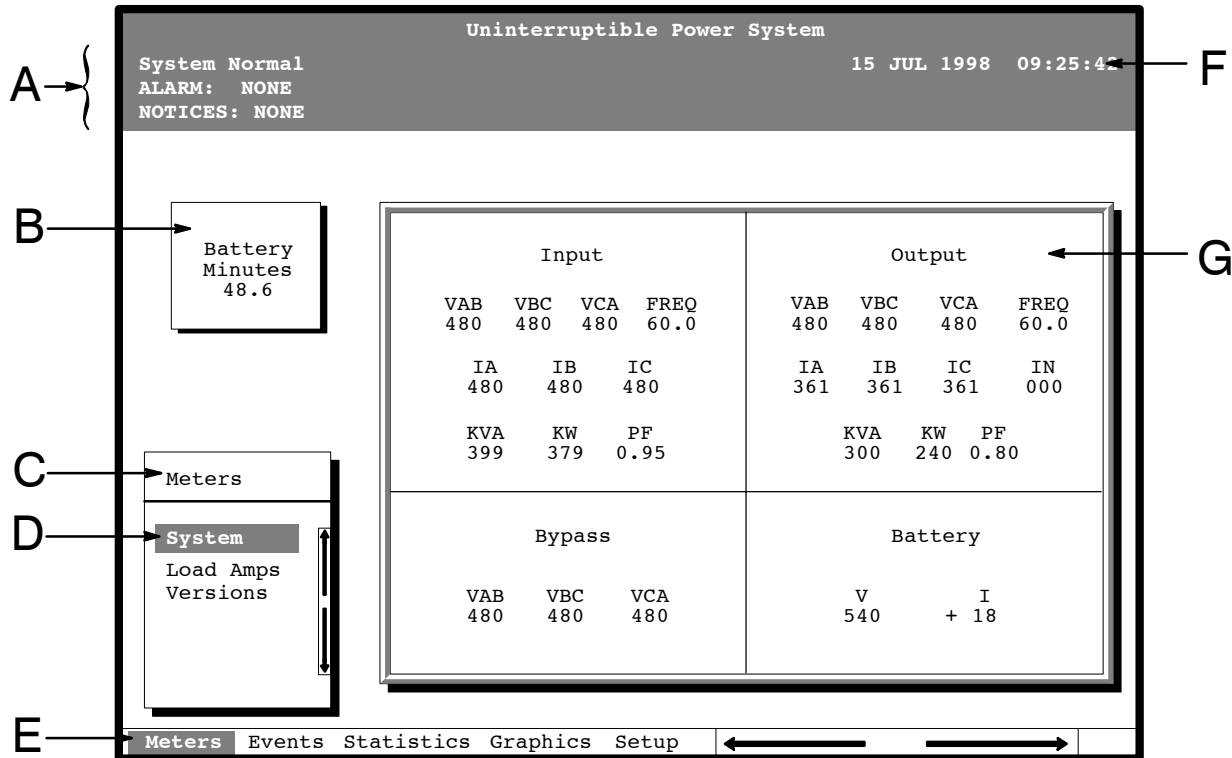


Figure 9–2. Parts of the LCD Screen
(Typical for Powerware 9315–300 480/480V Unit)

- A** The *UPS status area* contains three lines that display the current state of the UPS. The first line shows the present operational mode of the UPS. The second line shows the highest level of the current active alarms, and the third line shows any notices the UPS has posted. (For more information about alarms and notices, refer to Chapter 12, “Responding to System Events.”)
- B** The *battery charge box* shows the minutes of battery capacity available.
- C** The *menu box* shows the currently selected menu and lists the options available on that menu. The title at the top of the menu box is also shown below on the menu bar (E). Press the \uparrow and \downarrow pushbuttons to scroll up and down through the options in the menu box.
- D** The currently selected *option* is highlighted in the menu box. Press the \uparrow and \downarrow pushbuttons to move the highlight up or down. The data in the information area (G) changes accordingly.
- E** The *menu bar* lists the titles of the menus. The title of the menu currently displayed in the menu box is highlighted. When you press the \leftarrow and \rightarrow pushbuttons to move the highlight left or right, the data in the menu box and the information area change accordingly.

F The *time stamp* shows the current date and time. This date and time are recorded in the Event Log when a notice or alarm is activated.

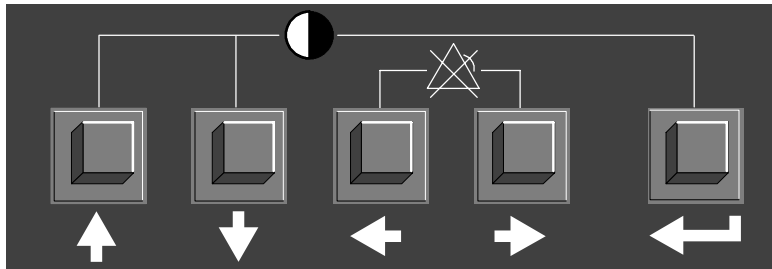
G The *information area* contains data about UPS status and operations. Select a menu option to display statistics or graphics.








You can use the LCD screen and the pushbuttons beneath it to:

- Monitor UPS operation
- Look at a log of UPS events (alarms, notices, and commands).




9.3 Using the Pushbuttons

The *pushbuttons* below the LCD screen are labeled with arrows indicating their functions:



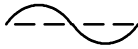
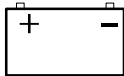



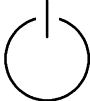
- Press the  and  pushbuttons to move through the options in a menu, or to scroll through the list of alarms and notices in the event log.
- Press the  and  pushbuttons to move through the menu titles on the menu bar. Press them simultaneously to silence the horn, or to test the lamps behind the status indicators.
- Press the  pushbutton to toggle the use of the  and  pushbuttons between the menu box and the information area.

9.4 Adjusting the Contrast

- Use the pushbuttons to adjust the contrast on the LCD screen. Hold down the  pushbutton, then press the  pushbutton to increase the contrast or the  pushbutton to decrease the contrast.

9.5 Reading the Status Indicators

The six symbols on the left side of the monitor panel are *status indicators*. They are backlit by colored light emitting diode (LED) lamps, and they work in conjunction with the alarm horn to let you know the operating status of the UPS.

NORMAL		This green symbol is lit when the UPS is operating in Normal mode. The power processing unit (PPU) is supplying power to the critical load.
Battery		This yellow symbol is lit when the UPS is operating in Battery mode. Because Battery mode is a normal condition of the UPS, the Normal indicator also remains lit.
Bypass		This yellow symbol is lit when the UPS is operating in Bypass mode. The critical load is supported by the bypass source. The Normal indicator is not lit when the system is in Bypass mode.
Notice		This yellow symbol is lit when the system needs attention. The LCD screen shows all active notices. Some notices may be accompanied by an audible horn. To silence the horn, press the ← and the → pushbuttons simultaneously. The Notice indicator may be lit along with other indicators.
Alarm		This red symbol is lit when a situation requires immediate attention. The LCD screen shows the highest priority active alarms. All alarms are accompanied by an audible horn. To silence the horn, press the ← and the → pushbuttons simultaneously. The Alarm indicator may be lit along with other indicators.
Standby		This yellow symbol is lit when electricity is present in the PPU of the UPS and the Normal indicator is not lit. During normal startup, this indicator illuminates until the the UPS transfers to Normal mode, at which point the Normal indicator is lit. During normal shutdown, the Standby indicator is lit until all energy in the UPS is dissipated and shutdown is complete.

For more information about audible horns, refer to the “System Event Horns” section of Chapter 12.

To test the LED lamps behind the status indicators, press the ← and → pushbuttons simultaneously for 3 seconds. All the indicators should light while you hold down these pushbuttons. If any indicator does not light, its LED may need to be replaced. Contact Customer Service if you have a problem with the indicator lamps.

9.6 Using the Menu Options

The UPS *menus* allow you to display data in the information area to help you monitor and control UPS operation. The following menus and options are available:

- **Meters** Displays performance meters for the system or critical load.
- **Events** Displays the list of Active System Events and a historical log of system events.
- **Statistics** Displays statistical information about UPS operations for the battery, load, or line.
- **Graphics** Displays a real-time graphic representation of the flow of current through the internal UPS components.
- **Setup** Allows you to configure the UPS communications port and set the date and time for the time stamp.

9.6.1 System Meters Screen

Figure 9–3 shows the LCD screen as it appears when you first start the UPS. The Meters menu is displayed in the menu box, with the System option highlighted. In the information area, the system meters show their current readings.

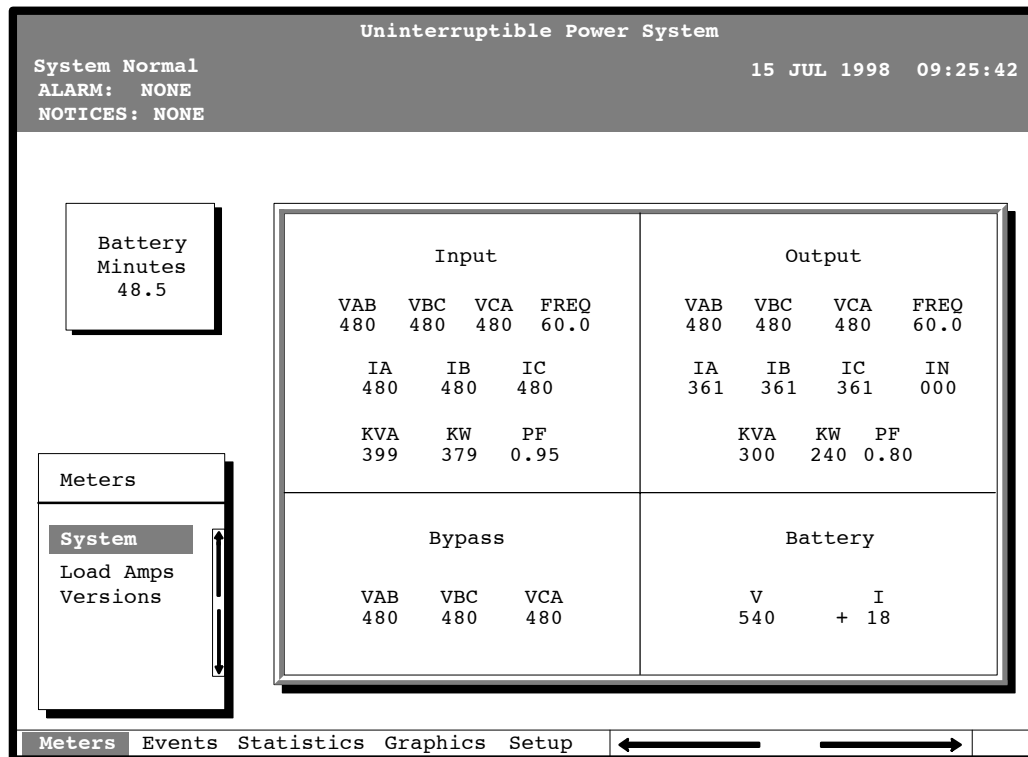


Figure 9–3. System Meters Screen
(Typical for Powerware 9315–300 480/480V Unit)

The Input area shows the phase-to-phase voltage, frequency, and phase current of the incoming utility, followed by the KVA, KW, and power factor measurements. The output area shows the same information for the power being output by the UPS.

The Bypass area shows the phase-to-phase voltage of the bypass source. The Battery area displays the DC voltage (V) and the DC current (I).

9.6.2 Load Amp Meters Screen

Select **Load Amps** from the Meters menu to see a real-time bar graph of the output current of the UPS. The graph shows the current for each phase.

Figure 9–4 shows the Load Amps Meters screen.

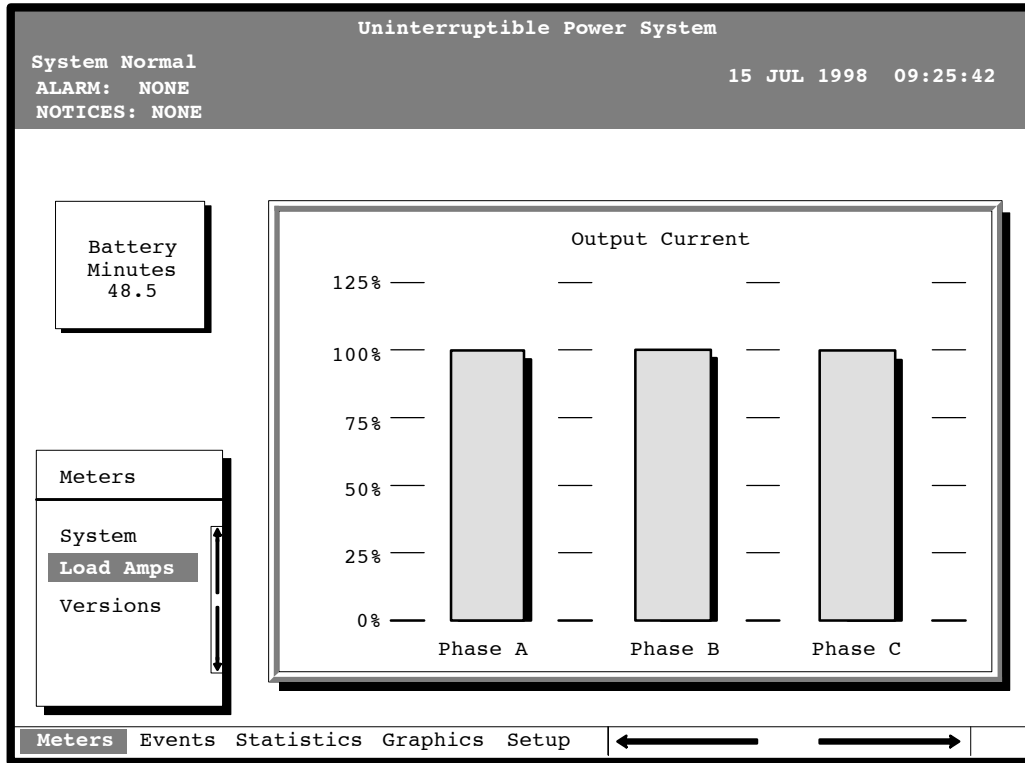


Figure 9–4. Load Amps Meters Screen

9.6.3 Software Versions Screen

Select **Versions** from the Meters menu to see the software versions installed on the UPS.

Figure 9–5 shows the Versions screen.

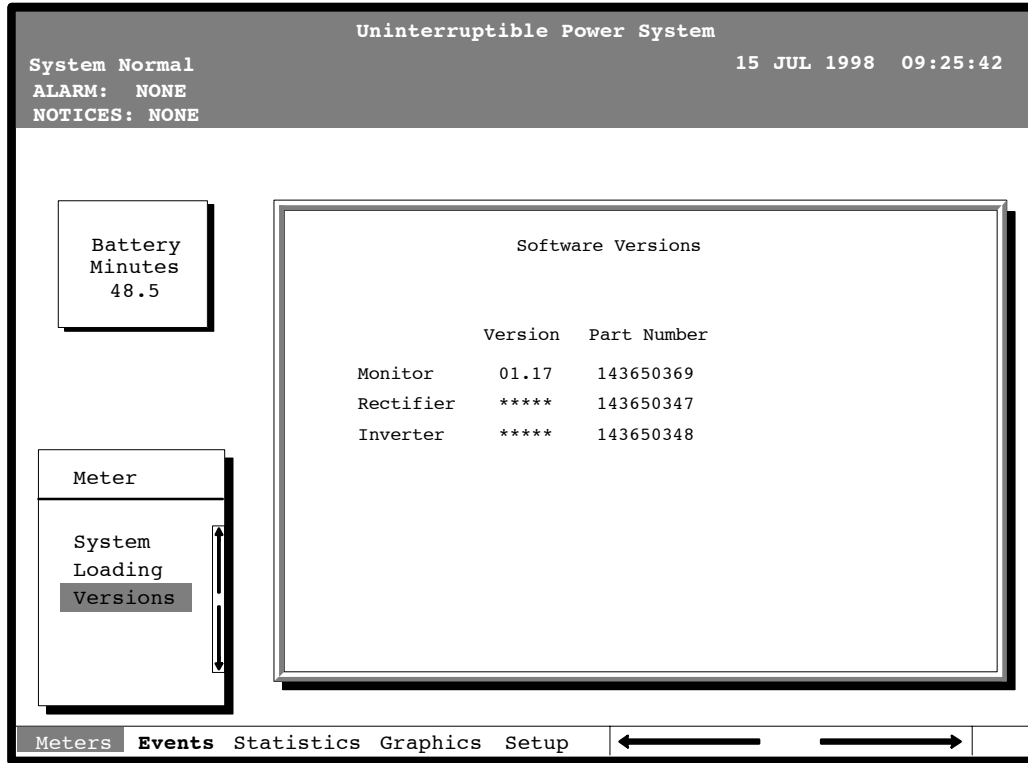


Figure 9–5. Versions Screen

9.6.4 System History Screen

Select **History** from the Events menu to display the Event History Log. The Event History Log lists up to 400 system events in chronological order, with the most recent event listed last. The end of the log (the most recent events) appears when you display the screen, and you must scroll upward to view older event listings.

Figure 9–6 shows the Event History Log screen.

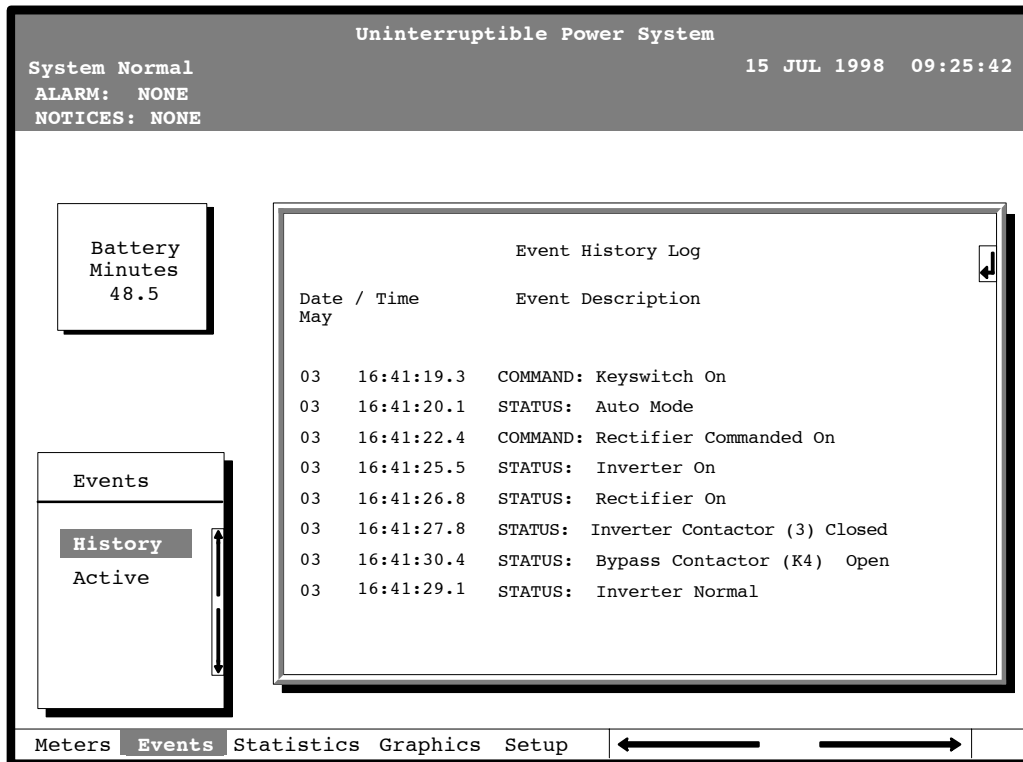


Figure 9–6. Event History Log Screen

A small return arrow (↵) appears in the upper right corner of the information area of the Event History Log screen. This arrow is a reminder that you can press the ↵ pushbutton on the Monitor Panel to toggle the scroll bar between the menu box and the information area. When the scroll bar is in the information area, the return arrow is in the menu box. When the scroll bar is in the menu box, the return arrow is in the information area.

When the scroll bar is in the information area, you can press the ↑ and ↓ pushbuttons to scroll through the Event History log.

9.6.5 Active System Events Screen

Select **Active** from the Events menu to display a listing of all system events that are currently active. The most recent system event is listed first. As events clear, they are removed from the Active System Events listing.

Figure 9–7 shows the Active System Events screen.

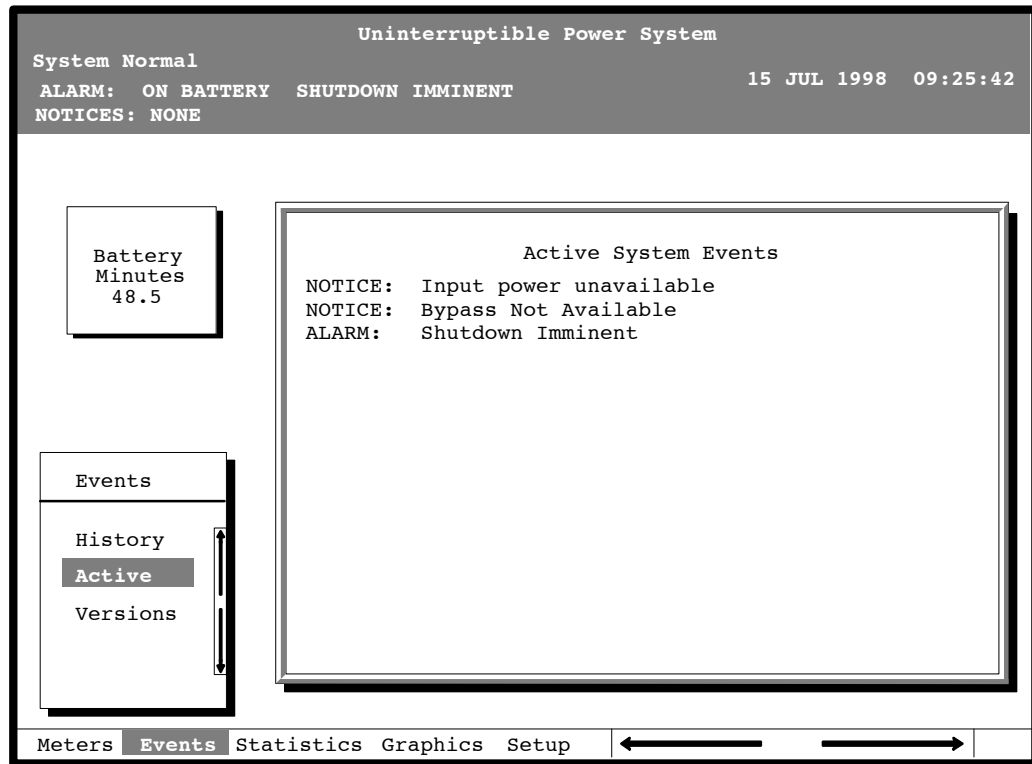


Figure 9–7. Active System Events Screen

9.6.6 Unit Statistics Screen

Select **Unit** from the Statistics menu to display a listing of statistics about UPS operation.

Figure 9–8 shows the Unit Statistics screen.

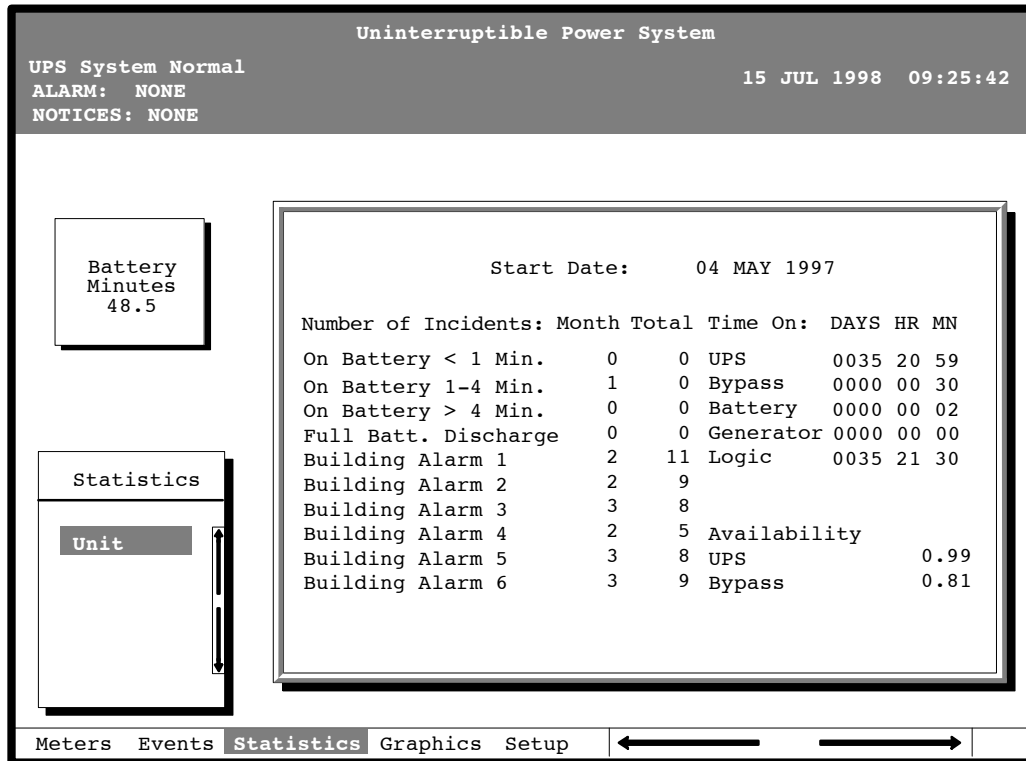


Figure 9–8. Unit Statistics Screen

The left column shows the number of UPS incidents for the current month and since the start date shown at the top of the screen. The top right column shows the time that the UPS was on bypass, battery, or generator, and the amount of time the UPS logic has been functioning since the start date. The lower right column shows the percent of availability of the UPS and the bypass source.

9.6.7 Mimic Screen

Select **Mimic** from the Graphics menu to display a real-time graphical representation of the flow of current through the UPS.

Figure 9–9 shows the Mimic screen.

NOTE:

Number of UPMs showing on MIMIC screen is dependent on number of units installed at site.

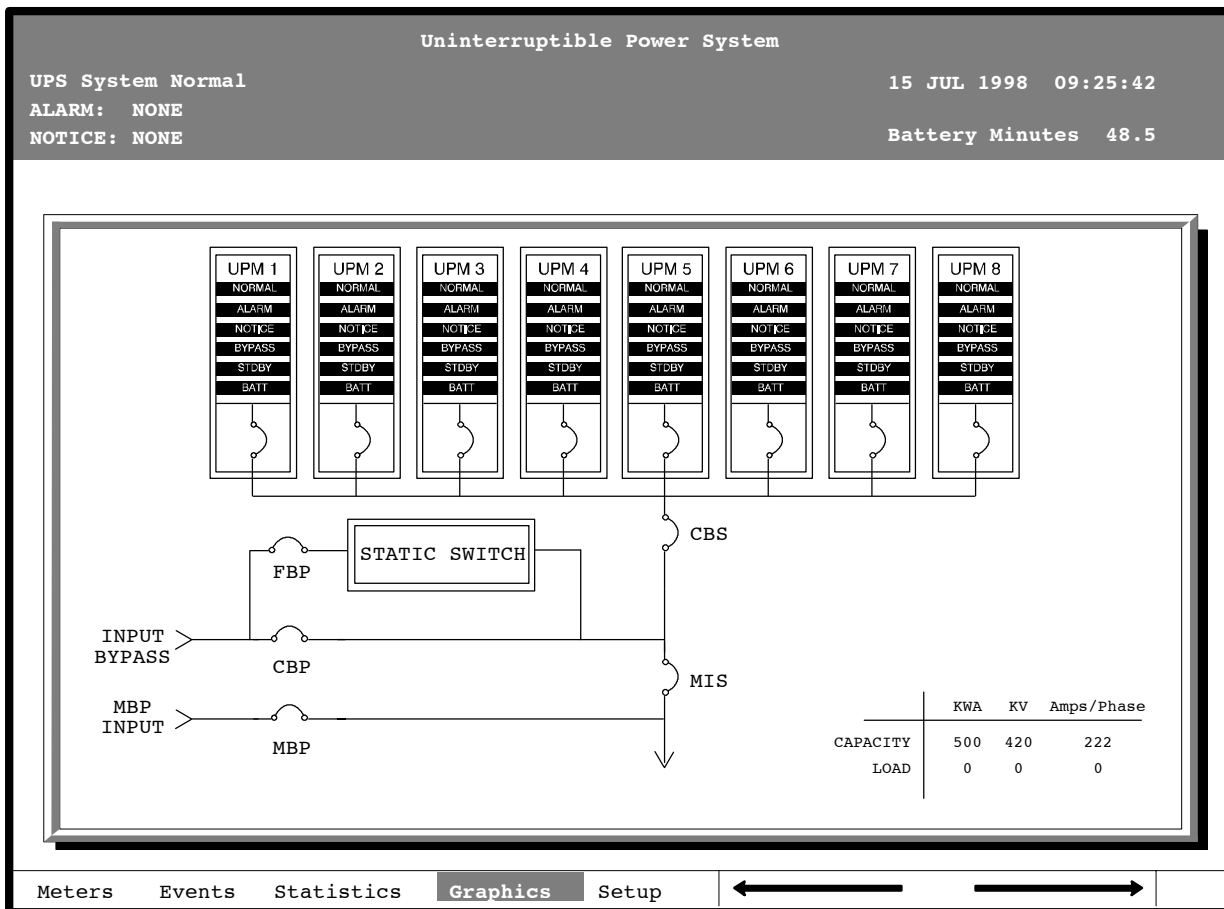


Figure 9–9. Mimic Screen

The Mimic screen shows the internal components of the UPS cabinet. The flow of current through the components is highlighted. *NOTE: The number of UPMs displayed on the Mimic screen is dependent on the actual number of units installed at location.* Also all alarms are shown for information purposes only. Only actual alarms would be shown in the installed instance.

9.6.8 Time Setup Screen

Select **Time** from the Setup menu to display the Time Setup screen. The Time Setup screen allows you to set the internal time stamp of the UPS. The time stamp is used for logging events in the Event History Log. Figure 9–10 shows the Time Setup screen.

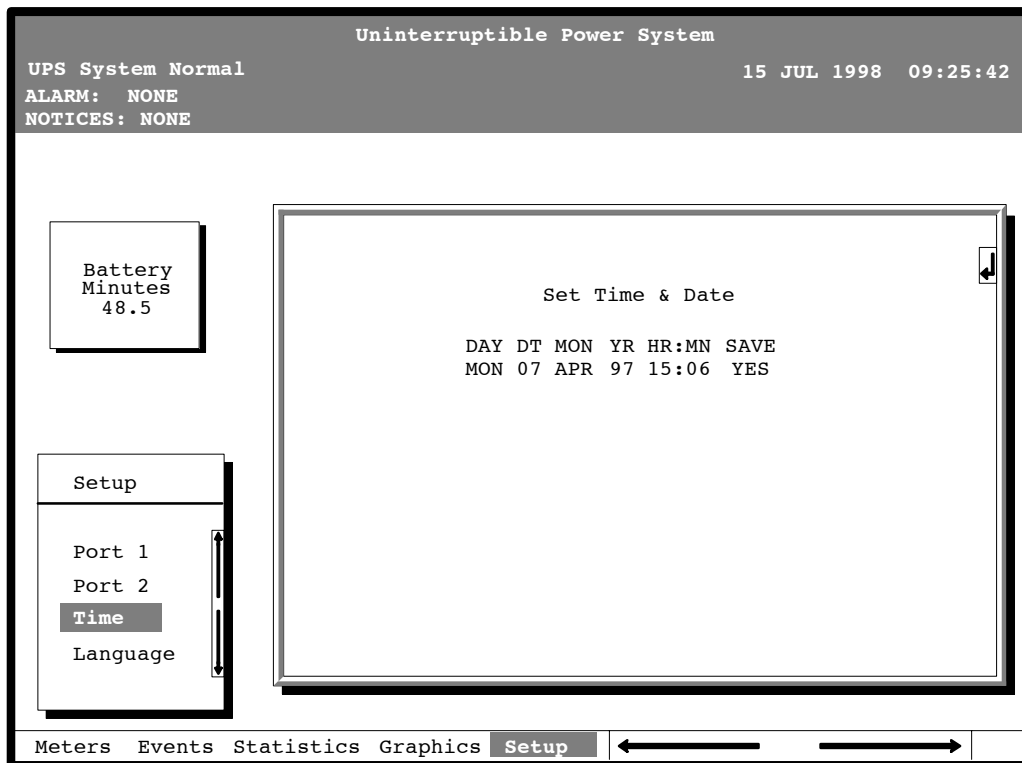








Figure 9–10. Time Setup Screen

The small return arrow () appears in the upper right corner of the Time Setup screen. This arrow is a reminder that you can press the  pushbutton on the Monitor Panel to toggle the pushbuttons between the menu box and the information area. When the scroll bar is in the information area, the return arrow is in the menu box. When the scroll bar is in the menu box, the return arrow is in the information area.

When the scroll bar appears in the information area, you can use the pushbuttons to change the time stamp settings. To change a setting in the time stamp, press the  and  pushbuttons to highlight the setting you want to change. To increase the setting (make it a higher value), press the  pushbutton. To decrease the setting (make it a lower value), press the  pushbutton. If you want to save the settings upon exit from this screen, be sure the SAVE field is set to YES.

9.6.9 Port Setup Screen

Select **Port 1** or **Port 2** from the Setup menu to display one of the Port Setup screens. The Port Setup screens allow you to specify settings for the two serial communication ports on the UPS. Figure 9–11 shows the Setup Serial Port 1 screen.

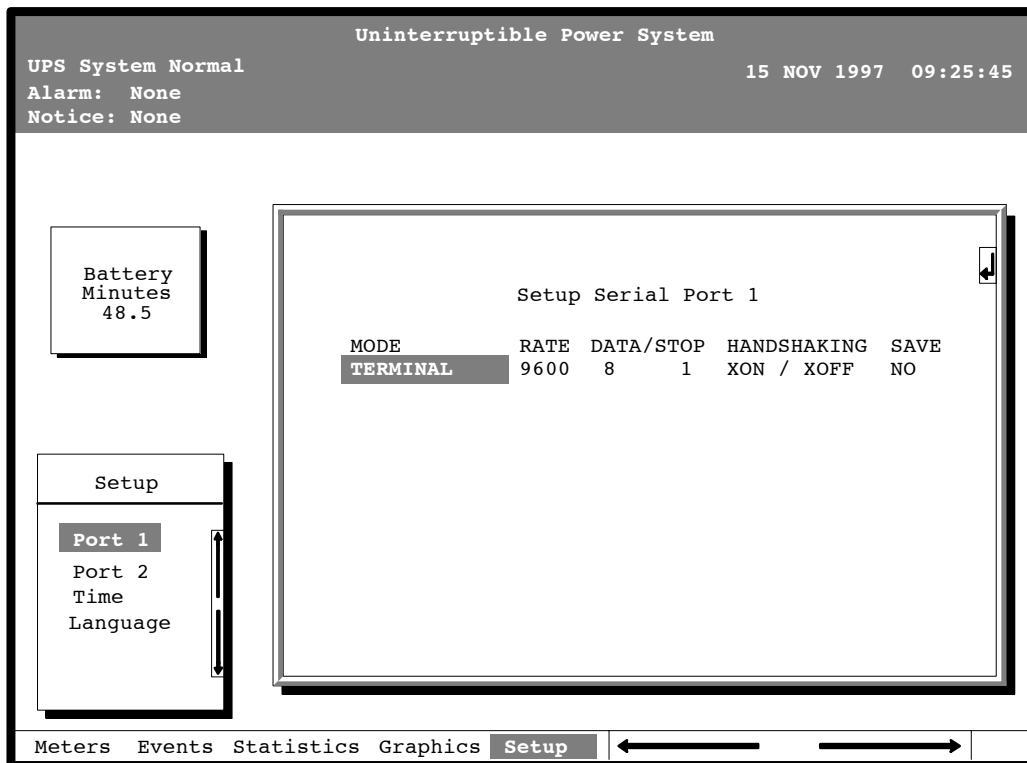


Figure 9–11. Port Setup Screen

The small return arrow (↵) appears in the upper right corner of the Port Setup screen. This arrow is a reminder that you can press the ↵ pushbutton on the Monitor Panel to toggle the pushbuttons between the menu box and the information area. When the scroll bar is in the information area, the return arrow is in the menu box. When the scroll bar is in the menu box, the return arrow is in the information area.

When the scroll bar appears in the information area, you can use the pushbuttons to change the port configuration. To change a setting, press the ← and → pushbuttons to move the highlight to the setting you want to change. To scroll through the available options for that setting, press the ↑ or ↓ pushbutton. To save the settings upon exit from this screen, be sure the SAVE field is set to YES.

The setup screens for Port 1 and Port 2 are identical. For detailed information about configuring the serial ports, refer to Chapter 13, “Serial Communications.”

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Operating Instructions for the Parallel Capacity/Redundant System



10.1 General Information – Before You Start

The following procedures provide instructions for operating the Parallel Capacity/Redundant System.

- NOTE:** 1. Before starting the Parallel Capacity/Redundant system ensure all installation tasks are complete and a preliminary startup has been performed by authorized service personnel. The preliminary startup verifies all electrical interconnections to ensure the installation was successful and the Parallel Capacity/Redundant system operates properly.
2. Refer to Chapter 9 of this manual for description of SSBM controls and monitor panel functions.
3. Refer to the applicable **Powerware® 9315 UPS Operation** manual provided with the UPMs, for UPM operating instructions.

10.2 Operation of SSBM with Powerware 9315–200 thru 9315–500 UPMs

10.2.1 Initial Setup

1. Ensure the Switchboard System Bypass Module (SSBM) circuit breakers are manually charged and set as follows:

System Output Breaker (CBS)	–	OPEN
System Bypass Breaker (CBP)	–	OPEN
Backfeed Protection Breaker (FBP)	–	OPEN
Maintenance Isolation Breaker (MIS)	–	CLOSED (Optional)
Maintenance Bypass Breaker (MBP)	–	OPEN (Optional)

NOTE: When power is applied in the following step, circuit breakers CBS, CBP, and FBP will charge, if not already charged.

2. Close upstream UPM and SSBM Bypass input feeder circuit breakers.
3. Observe SSBM monitor screen becoming active and Alarm and Notice messages scrolling.

10.2.2 Manual Start

1. Perform the Initial Setup procedures.
2. On SSBM, turn the **SYSTEM MODE** key switch to **BYPASS** momentarily.
If a bypass source is available when you turn the **SYSTEM MODE** key switch to **BYPASS**, the critical load is immediately supplied by the bypass source in Bypass mode until the the UPMs are available and the SSBM has been manually transferred to Normal mode. The status indicators on the SSBM monitor screen indicate when the Parallel Capacity/Redundant system is in Bypass mode and Normal mode.
3. Observe that CBP and FBP have closed.
4. On first UPM, close CB1.
5. Observe UPM monitor screen becoming active as an indication of logic power.
6. Verify UPM is shown on the SSBM mimic screen.
7. On first UPM, set **BATTERY** switch to **NORMAL**.
8. On first UPM, set **MODE** switch to **NORMAL**.
9. On first UPM, turn the **START** switch to the right for 2 seconds and then release.
10. When UPM Battery Disconnected alarm and notification is received, close first UPM battery disconnect breaker.
11. On first UPM, turn the **START** switch to the right momentarily.
The rectifier turns on, then the inverter turns on. When the inverter reaches full voltage, K3 closes. Logic power is supplied and the UPM is ready to supply power to the critical load. It takes less than 1 minute for the UPM to achieve Normal mode.
12. Start remaining UPMs by repeating steps 4 through 10.
13. On SSBM monitor screen, check for On Bypass, UPMs Ready message.
14. If message appears, turn the SSBM **SYSTEM MODE** key switch to **NORMAL** momentarily.
15. Observe that breaker CBS closes and breaker CBP opens. System is now in Normal mode, with the critical load being supplied power from the UPMs.

10.2.3 Auto Start

NOTE: Automode must be enabled to use this procedure.

1. Perform the Initial Setup procedures.
2. On SSBM, turn the **SYSTEM MODE** key switch to **BYPASS** momentarily.
3. Observe that CBP and FBP have closed.
4. On all UPMs, close CB1
5. On all UPMs, set **BATTERY** switch to **NORMAL**.
6. On all UPMs, set **MODE** switch to **NORMAL**.
7. On SSBM, turn the **SYSTEM MODE** key switch to **NORMAL** momentarily.

The UPM rectifiers turn on.

If a bypass source is available, the critical load is immediately supplied by the bypass source in Bypass mode until the the UPMs are available. The status indicators on the SSBM monitor screen indicate when the Parallel Capacity/Redundant system is in Bypass mode and Normal mode.

8. Observe that CBS is open and CBP is closed.
9. When UPM Battery Disconnected alarm and notification message is received, close UPM battery disconnect breakers.

The UPM inverters turns on. When each inverter reaches full voltage, K3 closes. Logic power is supplied and the UPM is ready to supply power to the critical load. It takes less than 1 minute for the UPM to achieve Normal mode.

10. Once the Parallel Capacity/Redundant system is redundant, the critical load is automatically transferred from bypass to the UPMs and system is operating in normal mode.

NOTE: If transfer is not completed within one minute, the **SYSTEM MODE** key switch must be turned momentarily to **NORMAL** again to achieve normal operation.

10.2.4 Single UPM Shutdown

NOTE: If system is not redundant, UPM cannot be shut down using this procedure.

1. On UPM, turn the **MODE** switch to **BYPASS**.
2. On SSBM monitor screen, verify UPS OFF, message appears.
3. Set UPM battery disconnect breaker to open.
4. When UPM Battery Disconnected alarm and notification message is received, open CB1 on UPM. The UPM powers down.

WARNING:
Power is present at UPM CB1 input, until upstream UPM input feeder circuit breaker is opened. Fans and load side of K3 will still have voltage present.

10.2.5 SSBM Shutdown to Bypass

1. On SSBM, turn the **SYSTEM MODE** key switch to **BYPASS** momentarily.
2. Observe CBS opens and CBP closes.
3. On SSBM monitor screen, verify On Bypass, message appears. System is now on bypass.
4. Set UPM battery disconnect breakers to open.
5. When UPM Battery Disconnected alarm and notification message is received, open CB1 on all UPMs, except the last UPM. The last UPM must be shutdown using the UPM **LOAD OFF** pushbutton. Refer to “Using the UPM **LOAD OFF** Pushbutton” in this chapter.
6. To shutdown last UPM, press last UPM **LOAD OFF** pushbutton.

WARNING:
Power is present at UPM CB1 input, until upstream UPM input feeder circuit breaker is opened. Fans and load side of K3 will still have voltage present.

10.2.6 Restarting a Single UPM

1. On UPM, close CB1.
2. Observe UPM monitor screen becoming active as an indication of logic power.
3. Verify UPM is shown on the SSBM mimic screen.
4. On UPM, set **BATTERY** switch to **NORMAL**.
5. On UPM, set **MODE** switch to **NORMAL**.
6. On UPM, turn the **START** switch to the right for 2 seconds and then release.
7. When UPM Battery Disconnected alarm and notification is received, close UPM battery disconnect breaker.
8. UPM, will automatically return to online condition.
The rectifier turns on, then the inverter turns on. When the inverter reaches full voltage, K3 closes. Logic power is supplied and the UPM is ready to supply power to the critical load. It takes less than 1 minute for the UPM to achieve Normal mode.
9. On SSBM mimic screen, check for presence of UPM.

10.2.7 Using the UPM LOAD OFF Pushbutton

NOTE: *The UPM LOAD OFF pushbutton will only interrupt the ability for that module to deliver power to the critical bus. The redundant modules will continue to support the critical load. To remove all power from the critical load, use the **SSBM EMERGENCY UPM OFF pushbutton** (optional setup) or the optional **REMOTE EMERGENCY POWER OFF (REPO)** pushbutton.*

Load Off is initiated by the covered, red UPM **LOAD OFF** pushbutton on the Monitor Panel. This pushbutton is protected by a clear plastic shield to prevent accidental activation. In an emergency, you can press this pushbutton to instantaneously open the input breaker and interrupt UPM output. The UPM remains locked off until you reset the **LOAD OFF** pushbutton.

WARNING:

All power to the critical load is lost when you press this pushbutton. Use this feature only in an emergency or when you want to de-energize the critical load.

To restart the UPS after pressing the **LOAD OFF** pushbutton, follow the procedure “Resetting the UPM after Load Off” of this chapter before starting the UPS.

NOTE: *The UPM Remote Emergency Load Off option functions the same way as the **LOAD OFF** pushbutton on the Monitor Panel.*

10.2.8 To Use the LOAD OFF Pushbutton

1. Raise the clear plastic shield covering the red **LOAD OFF** pushbutton on the UPM Monitor Panel.
2. Press the **LOAD OFF** pushbutton.
The breaker and contactors open (you can hear them opening). The **CB1** switch trips, and the Load Off **PUSH TO RESET** pushbutton on the UPM Control Panel pops out. The UPM shuts down.

10.2.9 Resetting the UPM after LOAD OFF

CAUTION:
Do not attempt to restart the UPM after Load Off until the cause of the emergency has been identified and cleared.

The Load Off **PUSH TO RESET** pushbutton is a small white button on the UPM Control Panel. The **PUSH TO RESET** pushbutton pops out and the **CB1** switch trips when the **LOAD OFF** pushbutton on the Monitor Panel is activated.

To reset the UPM:

1. Press the Load Off **PUSH TO RESET** pushbutton until it clicks in and remains recessed.
2. Move the **CB1** switch from the center (tripped) position to **OFF**. The switch should be difficult to move from the **TRIPPED** position.
3. The UPM is now reset. To restart the UPM, follow the procedure in Chapter 4, "Starting and Stopping the UPS" in the applicable Powerware 9315 UPS Operators manual provided with the UPM.

10.2.10 Using the SSBM EMERGENCY UPM OFF Pushbutton

An SSBM Emergency UPM Off is initiated by the covered, red **EMERGENCY UPM OFF** pushbutton on the SSBM Control Panel. This pushbutton is protected by a clear plastic shield to prevent accidental activation. In an emergency, you can press this pushbutton to instantaneously control the UPM and SSBM output. The SSBM **EMERGENCY UPM OFF** pushbutton functions differently, depending on the Emergency Power Off (EPO) option specified when ordered. The options available are as follows:

- The critical load is transferred to bypass and UPMs powered down. UPM CB1 breakers remain closed.
- Power to the critical load is de-energized and UPMs powered down. UPM CB1 breakers remain closed.
- The critical load is transferred to bypass and UPMs powered down. UPM CB1 breakers trip and the UPM is cut off from utility power. This function requires additional EPO kit available from Powerware.
- Power to the critical load is de-energized and UPMs powered down. UPM CB1 breakers trip and the UPM is cut off from utility power. This function requires additional EPO kit available from Powerware.

The SSBM (including Bypass) remains locked off until you reset the **EMERGENCY UPM OFF** pushbutton.

To restart the UPS after pressing the **EMERGENCY UPM OFF** pushbutton, follow the procedure “Resetting the Parallel Capacity/Redundant System after Emergency UPM Off”, of this chapter, before starting the system.

NOTE: *The Remote SSBM Emergency Power Off (REPO) option functions differently than the SSBM EMERGENCY UPM OFF pushbutton on the SSBM control panel. If activated, the REPO option deenergizes the critical load, powers down the UPMs and opens UPM breakers CB1 and contactor K3. The Remote SSBM Emergency Power (REPO) option is not configurable to transfer the critical load to bypass source if activated.*

10.2.11 To Use the SSBM EMERGENCY UPM OFF Pushbutton

1. Raise the clear plastic shield covering the red **SSBM EMERGENCY UPM OFF** pushbutton on the SSBM Control Panel.

2. Press the **EMERGENCY UPM OFF** pushbutton.

The breakers and contactors open (you can hear them opening and closing) and the Emergency UPM Off **PUSH IN TO RESET** pushbutton on the SSBM Control Panel pops out.

10.2.12 Resetting the Parallel Capacity/Redundant System after an EMERGENCY UPM OFF

CAUTION:

Do not attempt to restart the system after Emergency UPM Off until the cause of the emergency has been identified and cleared.

The Emergency UPM Off **PUSH IN TO RESET** pushbutton is a small white button on the SSBM Control Panel. The **PUSH TO RESET** pushbutton pops out when the Emergency UPM Off pushbutton on the SSBM Control Panel is activated.

To reset the Parallel Capacity/Redundant system:

1. Press the Emergency UPM Off **PUSH IN TO RESET** pushbutton until it clicks in and remains recessed.
2. On the UPMs, move the **CB1** switches from the center (tripped) position to **OFF**. The switches should be difficult to move from the **TRIPPED** position.
3. The Parallel Capacity/Redundant system is now reset. To restart the Parallel Capacity/Redundant system, follow the procedure at the beginning of this Chapter.

10.3 Operation of SSBM with Powerware 9315–625 thru 9315–750 UPMs

10.3.1 Initial Setup

1. Ensure the Switchboard System Bypass Module (SSBM) circuit breakers are manually charged and set as follows:

System Output Breaker (CBS)	OPEN
System Bypass Breaker (CBP)	OPEN
Backfeed Protection Breaker (FBP)	OPEN
Maintenance Isolation Breaker (MIS)	CLOSED (optional)
Maintenance Bypass Breaker (MBP)	OPEN (optional)
 2. Ensure the UPS circuit breakers for all UPMs are set as follows:

UPS Input Breaker (CB1)	Open
UPS Battery Breaker (CB2) (MBB)	Open
UPS Output Breaker (CB3)	Open
 3. Ensure the Emergency UPM OFF PUSH TO RESET pushbuttons on the SSBM and all UPMs are pressed in.
- NOTE:** *When power is applied in the following step, circuit breakers CBS, CBP, and FBP will charge, if not already charged.*
4. Close upstream UPM and SSBM input feeder circuit breakers.
 5. Observe SSBM monitor screen becoming active and Alarm and Notice messages scrolling.
 6. Observe all UPM monitor screens become active as an indication of logic power.
 7. Verify all UPMs are shown on the SSBM mimic screen.

10.3.2 Manual Start

1. Perform the Initial Setup procedures.
2. On SSBM, turn the **SYSTEM MODE** key switch to **BYPASS** momentarily.
If a bypass source is available when you turn the **SYSTEM MODE** key switch to **BYPASS**, the critical load is immediately supplied by the bypass source in Bypass mode until the UPMs are available and the SSBM has been manually transferred to Normal mode. The status indicators on the SSBM monitor screen indicate when the Parallel Capacity/Redundant system is in Bypass mode and Normal mode.
3. Observe that CBP and FBP have closed.
4. On first UPM, set **BATTERY** switch to **ENABLE**.
5. On first UPM, turn the **MODE** key switch to **NORMAL** for three seconds.
6. Confirm the UPS breaker CB1 has closed by verifying breaker position on LCD mimic screen.
The rectifier and input/rectifier cooling fans blowers should be running.
7. Confirm UPS Battery Breaker CB2 (MBB) has closed by viewing breaker position on LCD Mimic screen.
NOTE: *If CB2 is a manual battery breaker, manually close CB2 after UPM Battery Disconnected alarm and notification is received.*

The inverter and output/inverter cooling blowers turn on. When the inverter reaches full voltage, UPS breaker CB3 closes. It takes less than 1 minute for the UPS to achieve Normal mode. If UPS is not in Autorestart, turn the **MODE** key switch to **NORMAL** for three seconds to transfer to Normal mode.
8. UPS is now operating in Normal mode.
9. Start remaining UPMs by repeating steps 4 through 8.
10. On SSBM monitor screen, check for On Bypass, UPMs Ready message.
11. If message appears, turn the SSBM **SYSTEM MODE** key switch to **NORMAL** momentarily.
12. Observe that breaker CBS closes, breaker CBP opens, and the SSW is turned off.

10.3.3 Auto Start

NOTE: Autorestart must be enabled to use this procedure.

1. Perform the Initial Setup procedures.
2. On SSBM, turn the **SYSTEM MODE** key switch to **BYPASS** momentarily.
3. Observe that CBP and FBP have closed.
4. On all UPMs, set **BATTERY** switch to **ENABLE**.
5. On SSBM, turn the **SYSTEM MODE** key switch to **NORMAL** momentarily.
The UPS CB1 breakers close.

The rectifiers and input/rectifier cooling blowers turn on.

All CB2 (MBB) UPS battery breakers close.

NOTE: If CB2 is a manual battery breaker, manually close CB2 after UPM Battery Disconnected alarm and notification is received.

All inverter and output/inverter cooling blowers turn on. When the inverters reach full voltage, the UPS CB3 breakers close. It takes less than one minute for the UPMs to achieve Normal mode.

The UPMs are now ready to supply power to the critical load.

6. Once the Parallel Capacity/Redundant system is redundant, the critical load is automatically transferred from bypass to the UPMs via the CBS breaker and system is operating in Normal mode.

NOTE: If transfer is not completed within one minute, the **SYSTEM MODE** key switch must be turned momentarily to **NORMAL** again to achieve normal operation.

10.3.4 Single UPM Shutdown

NOTE: If system is not redundant, UPM cannot be shut down using this procedure.

1. On UPM, turn the **MODE** key switch to **BYPASS** for three seconds.
2. Verify that UPS breakers CB1 and CB3 and battery breaker CB2 (MBB) are open and the UPM powers down.
3. On SSBM monitor screen, verify UPS OFF, message appears.

<p>WARNING: Power is present at UPM CB1 input, until upstream UPM input feeder circuit breaker is opened. The load side of CB3 will still have voltage present.</p>
--

10.3.5 SSBM Shutdown to Bypass

1. On SSBM, turn the **SYSTEM MODE** key switch to **BYPASS** momentarily.
2. Observe CBS opens, CBP closes.
3. On SSBM monitor screen, verify On Bypass message appears. System is now on bypass.
4. On all but the last UPM, turn the **MODE** key switch to **BYPASS** for three seconds.
5. Verify that UPS breakers CB1 and CB3 and battery breaker CB2 (MBB) are open and the UPM powers down.
6. To shut down last UPM, press last UPM **LOAD OFF** pushbutton.
7. Verify that UPS breakers CB1 and CB3 and battery breaker CB2 (MBB) are open and the UPM powers down.

WARNING:
Power is present at UPM CB1 input, until upstream UPM input feeder circuit breaker is opened.

10.3.6 Restarting a Single UPM

1. Close upstream UPM input feeder breaker.
2. Observe UPM monitor screen becoming active as an indication of logic power.
3. Verify UPM is shown on the SSBM mimic screen.
4. On UPM, set **BATTERY** switch to **ENABLE**.
5. On UPM, turn **MODE** key switch to **NORMAL** for three seconds
6. Confirm the UPS breaker CB1 has closed by viewing breaker position on LCD Mimic screen.
The rectifier and input/rectifier cooling blowers turn on.
7. Confirm UPS Battery Breaker CB2 (MBB) has closed by viewing breaker position on LCD Mimic screen.

NOTE: If CB2 is a manual battery breaker, manually close CB2 after UPM Battery Disconnected alarm and notification is received.

The inverter and output/inverter cooling blowers turn on. When the inverter reaches full voltage, UPS breaker CB3 closes. It takes less than 1 minute for the UPS to achieve Normal mode. If UPS is not in Autorestart, turn the **MODE** key switch to **NORMAL** for three seconds to transfer to Normal mode.

8. The UPM is now operating in Normal mode.
9. On SSBM mimic screen, check for presence of UPM.

10.3.7 Using the UPM EMERGENCY UPM OFF Pushbutton

NOTE: The UPM **EMERGENCY UPM OFF** pushbutton will only interrupt the ability for that module to deliver power to the critical bus. The redundant modules continue to support the critical load.

Emergency UPM shutdown is initiated by the covered, red UPM **EMERGENCY UPM OFF** pushbutton on the UPM Monitor Panel. This pushbutton is protected by a clear plastic shield to prevent accidental activation. In an emergency, you can press this pushbutton to instantaneously open all UPM breakers and interrupt UPM output. The UPM remains locked off until you reset the **EMERGENCY UPM OFF** pushbutton.

To restart the UPS after pressing the **EMERGENCY UPM OFF** pushbutton, follow the procedure “Resetting the UPM after Shutdown” of this chapter before starting the UPS.

NOTE: The UPM **REMOTE EMERGENCY LOAD OFF (REPO)** functions in the same way as the UPM **EMERGENCY UPM OFF** pushbutton on the UPM Monitor panel.

10.3.8 To Use the UPM EMERGENCY UPM OFF Pushbutton

1. Raise the clear plastic shield covering the red **EMERGENCY UPM OFF** pushbutton on the UPM Monitor Panel.
2. Press the **EMERGENCY UPM OFF** pushbutton.
UPS breakers CB1 and CB3 and Battery breaker CB2 (MBB) open. The **EMERGENCY UPM OFF PUSH TO RESET** pushbutton on the UPM Control Panel pops out. The UPM shuts down.

10.3.9 Resetting the UPM after an EMERGENCY UPM Shutdown

CAUTION:
Do not attempt to restart the UPM after Emergency UPM Shutdown until the cause of the emergency has been identified and cleared.

The **EMERGENCY UPM OFF PUSH TO RESET** pushbutton is a small white button on the UPM Control Panel. The **PUSH TO RESET** pushbutton pops out when the **EMERGENCY UPM OFF** pushbutton on the Monitor Panel is activated.

To reset the UPM:

1. Press the **EMERGENCY UPM OFF PUSH TO RESET** pushbutton until it clicks in and remains recessed.
2. The UPM is now reset. To restart the UPM, follow the procedure in this chapter, “Restarting a Single UPM.”

10.3.10 Using the SSBM EMERGENCY UPM OFF Pushbutton

An SSBM Emergency UPM Off is initiated by the covered, red **EMERGENCY UPM OFF** pushbutton on the SSBM Control/Monitor Panel. This pushbutton is protected by a clear plastic shield to prevent accidental activation. In an emergency, you can press this pushbutton to instantaneously control the UPM and SSBM output. The SSBM **EMERGENCY UPM OFF** pushbutton functions differently, depending on the Emergency Power Off (EPO) option specified when ordered. The options available are as follows:

- The critical load is transferred to bypass and UPMs powered down. UPM breakers CB1, CB2 (MBB) and CB3 open.
- Power to the critical load is de-energized and UPMs powered down. UPM breakers remain CB1, CB2 (MBB) and CB3 open.
- The critical load is transferred to bypass and UPMs powered down. UPM CB1 breakers trip and the UPM is cut off from utility power. This function requires additional EPO kit available from Powerware.
- Power to the critical load is de-energized and UPMs powered down. UPM CB1 breakers trip and the UPM is cut off from utility power. This function requires additional EPO kit available from Powerware.

The SSBM (including Bypass) remains locked off until you reset the **EMERGENCY UPM OFF** pushbutton.

To restart the UPS after pressing the **EMERGENCY UPM OFF** pushbutton, follow the procedure “Resetting the Parallel Capacity/Redundant System after Emergency UPM Off”, of this chapter, before starting the system.

NOTE: *The Remote SSBM Emergency Power Off (REPO) option functions differently than the SSBM **EMERGENCY UPM OFF** pushbutton on the SSBM control panel. If activated, the REPO option will deenergize the critical load, power down the UPMs and open UPM breakers CB1, CB2 (MBB), and CB3. The Remote SSBM Emergency Power Off (REPO) option is not configurable to transfer the critical load to bypass power, if activated.*

10.3.11 To Use the SSBM EMERGENCY UPM OFF Pushbutton

1. Raise the clear plastic shield covering the red **SSBM EMERGENCY UPM OFF** pushbutton on the SSBM Control Panel.
2. Press the **EMERGENCY UPM OFF** pushbutton.
Breakers open and close (you can hear them opening and closing) and the Emergency UPM Off **PUSH IN TO RESET** pushbutton on the SSBM Control Panel pops out.

10.3.12 Resetting the Parallel Capacity/Redundant System after EMERGENCY UPM OFF

CAUTION:

Do not attempt to restart the system after Emergency UPM Off until the cause of the emergency has been identified and cleared.

The Emergency UPM Off **PUSH IN TO RESET** pushbutton is a small white button on the SSBM Control/Monitor Panel. The **PUSH TO RESET** pushbutton pops out when the Emergency UPM Off pushbutton on the SSBM Control/Monitor Panel is activated.

To reset the Parallel Capacity/Redundant system:

1. Press the Emergency UPM Off **PUSH IN TO RESET** pushbutton until it clicks in and remains recessed.
2. The Parallel Capacity/Redundant system is now reset. To restart the Parallel Capacity/Redundant system, follow the procedure at the beginning of this chapter.

10.4 Operation of the Optional System Maintenance Bypass (SMB)

The optional System Maintenance Bypass (SMB) is available with electrical controls. The SMB electrical controls are available with or without Redundant CBP controls. Operations of each configuration is detailed below.

CAUTION:

The critical load is not protected while the Parallel Capacity/Redundant system is in Maintenance Bypass or Bypass mode.

10.4.1 Operation with Electrical Controls

NOTE: Refer to Drawing 164201373 – 11 in Appendix A for the location of the Maintenance Bypass key switch.

Transfer to Maintenance Bypass:

1. Ensure power is supplied to the MBP breaker input before attempting transfer to maintenance bypass.
2. On SSBM, ensure that SSBM CBS breaker is open or system is not on inverter.
3. On SSBM, turn the Maintenance Bypass key switch to the left (TO MAINTENANCE) momentarily.
4. Observe MBP closes and MIS opens. System is now on maintenance bypass.
5. To shutdown SSBM and UPMs, follow procedure under *SSBM Shutdown to Bypass*.
6. On SSBM, open CBP and FBP breakers.

WARNING:
**Power is available at CBP and FBP inputs, until upstream SSBM bypass input
feeder circuit breaker is opened.**

Transfer from Maintenance Bypass:

1. If system was shut down, follow *Manual Start* or *Auto Start* procedure to start system.
2. Ensure SSBM is on bypass.
3. On SSBM, turn the Maintenance Bypass key switch to the right (FROM MAINTENANCE) momentarily.
4. Observe MIS closes and MBP opens. System is now in bypass mode.

10.4.2 Operation with Electrical Controls with Redundant CBP Controls

NOTE: Refer to Drawing 164201373–11 in Appendix A for the location of the Maintenance Bypass key switch.

Transfer to Maintenance Bypass:

1. Ensure power is supplied to the MBP breaker input before attempting transfer to maintenance bypass.
2. On SSBM, ensure that SSBM CBS breaker is open or system is not on inverter.
3. On SSBM, turn the Maintenance Bypass key switch to the left (TO MAINTENANCE) momentarily.
4. Observe MBP closes and MIS opens. System is now on maintenance bypass.
5. To shut down SSBM and UPMS, follow procedure under *SSBM Shutdown to Bypass*.
6. On SSBM, open CBP and FBP breakers.

WARNING:
**Power is available at CBP and FBP inputs, until upstream SSBM bypass input
feeder circuit breaker is opened.**

Transfer from Maintenance Bypass:

1. If system was shut down, follow *Manual Start* or *Auto Start* procedure to start system.
2. Ensure SSBM is on bypass.
3. On SSBM, turn the Maintenance Bypass key switch to the right (FROM MAINTENANCE) momentarily.
4. Observe MIS closes and MBP opens. System is now in bypass mode.

Redundant CBP Operation:

The Redundant CBP controls protect the critical load against power losses caused by CBP breaker close failures during manual or automatic operations.

1. Redundant CBP operations can be recognized by an alarm condition at the SSBM and the following breaker conditions:

CBP	Open
CBS	Open
FBP	Open
MIS	Closed
MBP	Closed

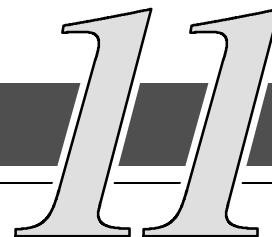
2. Once Redundant CBP operation has occurred, the SSBM should be isolated to allow CBP breaker maintenance without impact on the system's critical load. To achieve SSBM isolation and to exit from Redundant CBP operation, turn the SMB key switch to the left (TO MAINTENANCE) momentarily. This action will open the UPS system's MIS breaker and place the UPS system fully into *Maintenance Bypass* mode.

Note: *If the CBP breaker failure can be repaired without SSBM isolation, complete the CBP repairs and then, proceed to step 3 below.*

3. After the CBP breaker has been repaired, the UPS system can be transferred from *Maintenance Bypass* mode to *Bypass* mode as described above.

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Using Features and Options



11.1 General

The many standard features of your Parallel Capacity/Redundant system Parallel Capacity/Redundant system provide consistent, economical, and dependable power protection. In addition, you can add available options to enhance the performance of your system. This chapter provides descriptions of some of the features and options introduced earlier in this manual. Refer to drawings 164201373–4 and 164201373–13 in Appendix A for location of the customer interface panel and for terminal wiring information.

NOTE: Refer to the applicable Powerware® 9315 Operation manual provided with the UPS for UPS features and options

11.2 Building Alarm Monitoring

This standard feature lets you connect the Switchboard System Bypass Module (SSBM) to your building alarms, such as smoke detectors or overtemperature alarms. The terminals for external connections are located inside the SSBM on the customer interface panel.

Regardless of how you assign the building alarms, they display as Building Alarm 1, Building Alarm 2, Building Alarm 3, etc., on the LCD screen of the Monitor Panel. You should use twisted pair wires for each alarm input and common.

If the SSBM is equipped for a Powerware Sync Control, Hot-Tie Control, or continuous duty static switch, not all Building Alarms will be available for customer use. See Appendix A, Drawing 164201373–4 for affected areas.

If the SSBM is equipped with an optional System Maintenance Bypass (SMB), not all Building Alarms will be available for customer use. See Appendix A, Drawing 164201373–4 for affected areas.

11.3 General Purpose Relay Contacts

Two general purpose relay contacts are provided as a standard feature on the SSBM. The alarm contacts (one notice and one alarm) are located inside the SSBM on the customer interface panel. Refer to drawings 164201373–4 and 164201373–13 in Appendix A for location of the customer interface panel and for terminal wiring information.

You can specify that each contact be either normally closed (NC) or normally open (NO). If the state of the contact changes from the state you specify as normal, a signal is issued. You can connect these contacts to equipment at your facility (such as a light or an alarm bell) to let you know when an alarm is active on the SSBM. This feature is useful if the SSBM is located in a remote area where the SSBM alarm horn may not be heard immediately.

NOTE: In choosing contacts, note that Relay 1 is normally deenergized and is only energized for an alarm condition. Relay 2 is normally energized and is only deenergized for an alarm condition.

CAUTION:
Contacts should not be operated in excess of
30 VAC or 42.4V peak AC or DC @ 1A maximum.

11.4 Remote Monitor Panel

As an option, you can install Remote Monitor Panels (RMPs) to monitor the operation of the Parallel Capacity/Redundant system from virtually any location within your facility, up to 500 feet from the SSBM. Each RMP contains backlit status indicators and a local horn. You can flush-mount or surface-mount an RMP on a desktop, wall, or wherever you have a serial interface line. A maximum of two monitoring accessories (RMPs, Relay Interface Modules (RIMs), or Supervisory Contact Modules (SCMs)) can be installed. See Table 11–1 for the number of accessories permitted. Figure 11–1 shows an RMP.

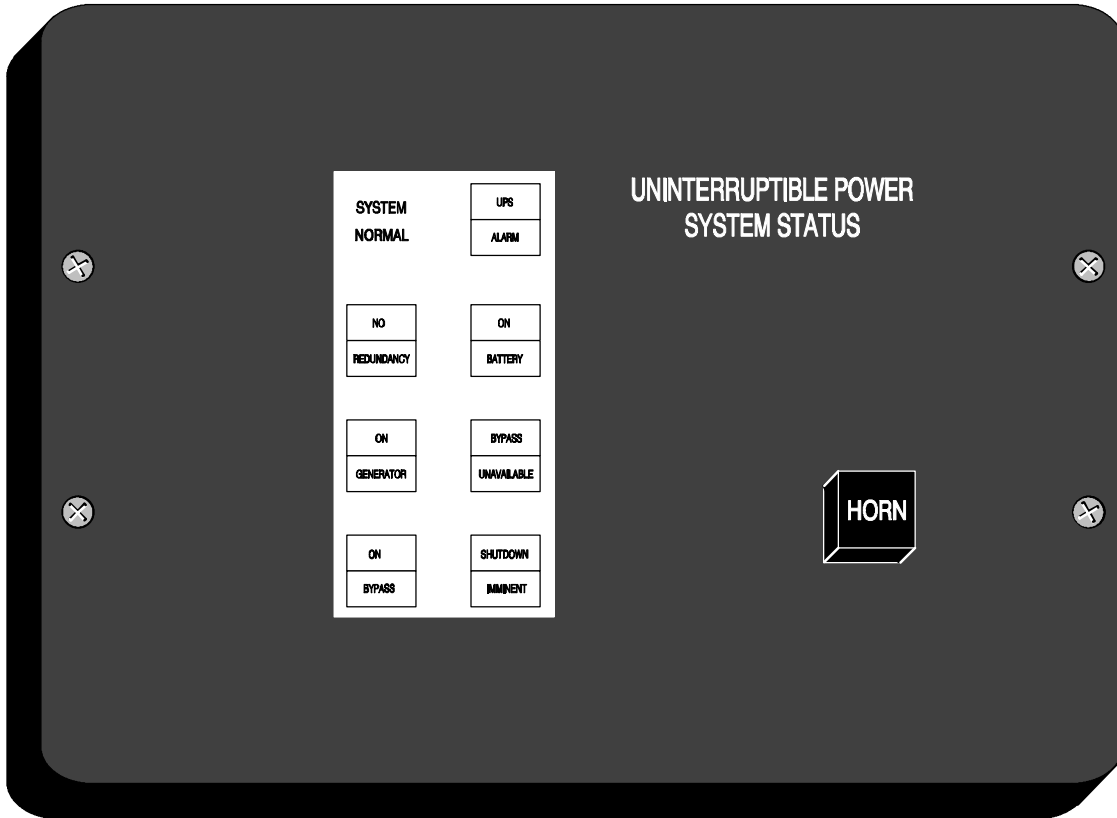


Figure 11–1. Remote Monitor Panel

Table 11–1. Optional Monitoring Accessories		
Number and Type of Accessories Permitted		
Remote Monitor Panel	Relay Interface Module	Supervisory Contact Module
2	—	—
—	2	—
—	—	2
1	1	—
1	—	1
—	1	1

The RMP contains a local horn and the following backlit status indicators:

SYSTEM NORMAL

The UPS is energized (either with utility power or battery backup) and is supplying conditioned power to the critical load.

NO REDUNDANCY

This indicator applies only to parallel systems when one cabinet is not functioning. This feature is not available on this system.

ON GENERATOR

This alarm means that the UPS input and bypass are being supplied by the power from the generator, instead of from the utility power.

ON BYPASS

The bypass source is supplying the critical load. Usually this means that the UPS is not energized. The load is not protected in Bypass mode, and a horn sounds after 30 seconds.

UPS ALARM

The UPS system is issuing an alarm. Conditions that affect the current UPS mode are indicated by the alarm lamps and horn on the UPS.

ON BATTERY

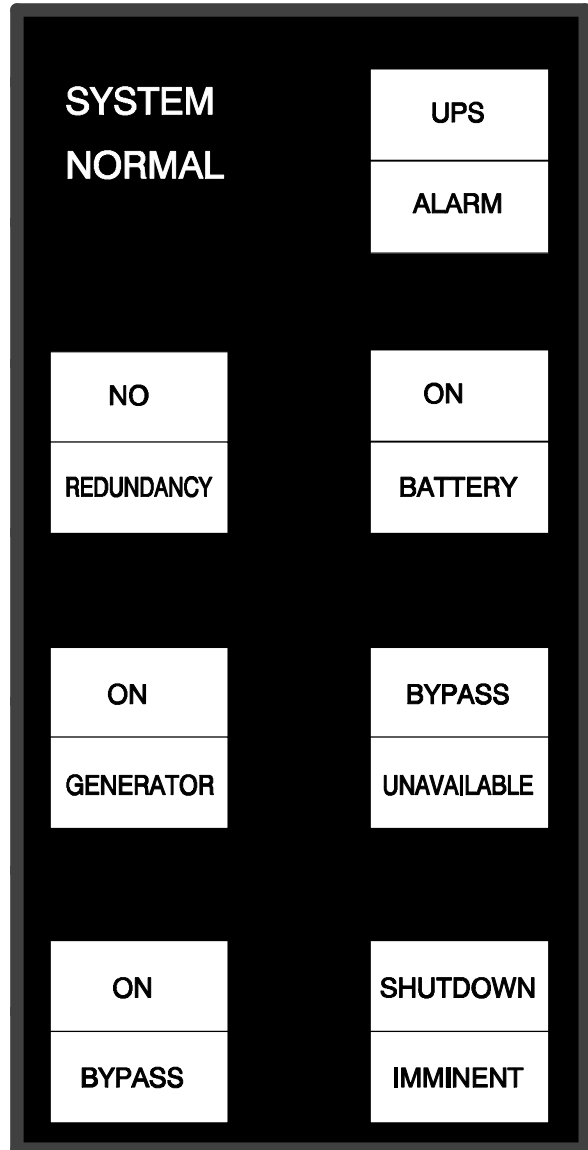
The UPS battery backup is supplying the critical load. The utility power is either interrupted or out of specification. The SYSTEM NORMAL indicator is also lit.

BYPASS UNAVAILABLE

The UPS system is in Normal mode, but a bypass source is not within specification. A horn sounds after 30 seconds.

SHUTDOWN IMMINENT

The UPS is preparing to shut down because the UPS is in Battery mode and the DC voltage is approaching its low limit. This light is accompanied by an audible alarm horn.



11.5 Relay Interface Module

An optional Relay Interface Module (RIM) uses relay contact closures to indicate the operating status and alarm condition of the Parallel Capacity/Redundant system. A maximum of two monitoring accessories (RMPs, RIMs, or SCMs) can be installed. See Table 11–1 for the number of accessories permitted. Figure 11–2 shows the RIM with its four 15-pin connectors labeled J1 through J4.

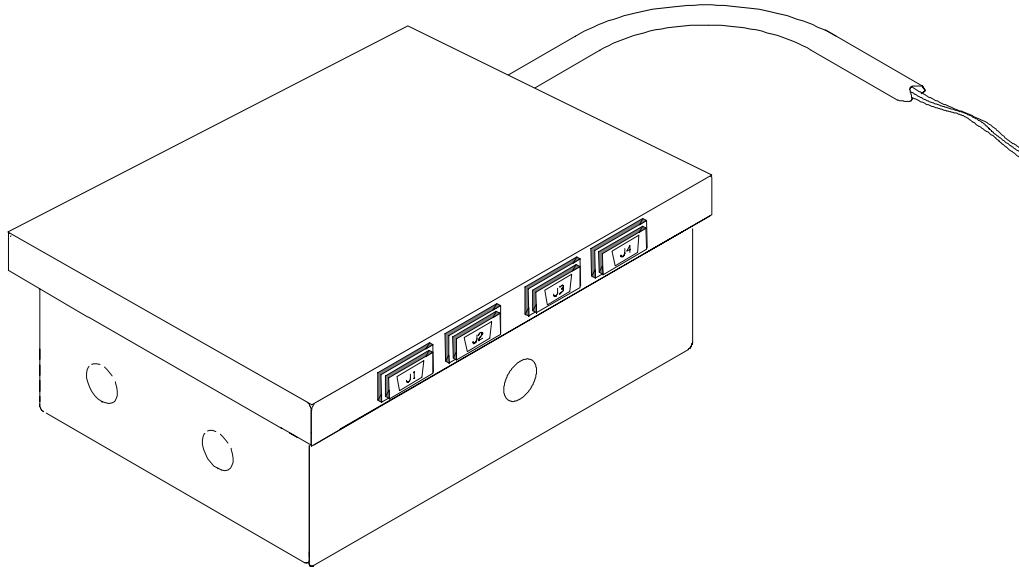


Figure 11–2. Relay Interface Module

The RIM can provide these signals:

- **UPS AVAILABLE** (pins 1 and 12) Contacts are closed when the UPS is offline.
- **UPS OFF LINE** (pins 3 and 13) Contacts are closed when the UPS is operating in Normal mode.
- **UTILITY FAILURE** (pins 6 and 15) Contacts are closed when Utility Failure is detected.
- **BATTERY WEAK** (pins 5 and 14) Contacts are closed when approximately 2 minutes of battery time is remaining, before the critical load is lost.

11.6 Supervisory Contact Module

An optional Supervisory Contact Module (SCM) establishes an interface between the Parallel Capacity/Redundant system manufacturer's equipment and the customer's monitor. This interface allows the customer to monitor operational status of the Parallel Capacity/Redundant system equipment. A maximum of two monitoring accessories (RMPs, RIMs, or SCMs) can be installed. See Table 11–1 for the number of accessories permitted. Figure 11–3 shows the SCM, input connections on TB1, and output connections on TB2.

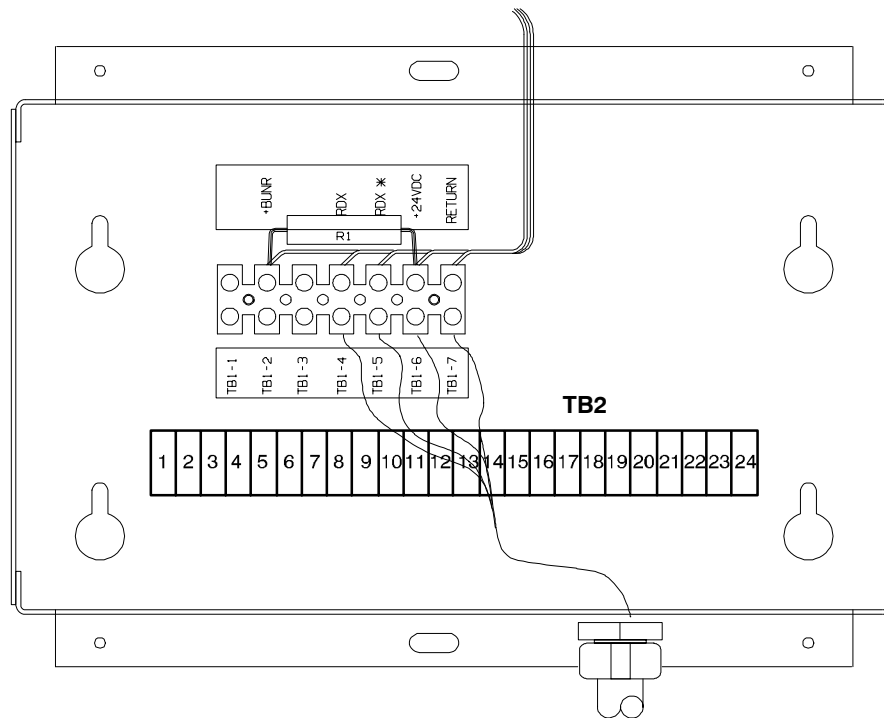


Figure 11–3. Supervisory Contact Module

The SCM provides signals for the following indications:

- **SYSTEM NORMAL** TB2–1 through TB2–3
- **NO REDUNDANCY** TB2–4 through TB2–6
- **ON GENERATOR** TB2–7 through TB2–9
- **BYPASS NOT AVAILABLE** TB2–10 through TB2–12
- **ON BATTERY** TB2–13 through TB2–15
- **UPS ALARM** TB2–16 through TB2–18
- **ON BYPASS** TB2–19 through TB2–21
- **SHUTDOWN IMMINENT** TB2–22 through TB2–24

Refer to the applicable Powerware 9315 Installation manual chapter, *Installing a Supervisory Contact Module*, for TB2 contact configurations.

11.7 Common Battery Racks

A Common battery rack can be used to supply the DC input to the Parallel Capacity/Redundant system UPS modules. This common rack would be used in place of the individual racks for each module. You can enhance the protection time provided by your Parallel Capacity/Redundant system by adding one or more battery racks. The battery racks should be equipped with sealed lead-acid, maintenance-free batteries. An external battery disconnect switch must be used. Refer to the applicable *Powerware® 9315 Installation* manual provided with the UPS for battery requirements and installation instructions.

11.8 External Battery Disconnect for Common Battery Racks

An optional external DC circuit breaker provides a manual means of disconnecting a battery rack from the UPS modules in the Parallel Capacity/Redundant system. The circuit breaker is enclosed in a wall-mounted box. You can install it anywhere between the remote DC supply and the UPS, according to national and local codes.

The breaker switch should be set to ON for normal UPS operation when DC power is available at the UPS. When service personnel are performing maintenance on the UPS or battery cabinet, the switch should be set to OFF.

Note 1: There is no DC disconnect device within the UPMs.

Note 2: The DC input to the UPM is protected by internal fuses F21 and F22.

Note 3: The UPM DC disconnect trip signal from TB4, points 1 and 2 (shunt trip) or TB4, points 1 and 3 (UV trip) must be connected to the DC source disconnect device(s). Each UPM must have a separate disconnect device.

11.8.1 ModBus Cards

The Powerware ModBus Card is an optional X-Slot connectivity device that allows you to continuously and reliably monitor the UPS system in your Building Management System (BMS). See Powerware ModBus Card User Guide 164201376, and Powerware Expansion Chassis User Guide, 164201336 for details.

12.1 General

When the Parallel Capacity/Redundant system is running in Normal mode, it continually monitors itself and the incoming utility power. In Battery or Bypass modes, the Switchboard System Bypass Module (SSBM) may issue alarms to let you know exactly what event caused the change from Normal mode. System events on the SSBM can be indicated by horns, lights, messages, or all three.

Select **Active** from the Events menu on the LCD screen to look at the Active System Events screen. This screen shows any currently active alarms, notices, or commands.

NOTE: Refer to the applicable **Powerware® 9315 UPS Operation** manual provided with the UPMs, for UPM system events.

12.2 System Event Horns

The system event horn beeps according to the type of event it is signifying:

- When the UPS detects an alarm that requires your attention, the horn beeps at 1/2-second intervals.
- When a notice occurs, the horn beeps at 2-second intervals.

12.3 System Event Lights

The status indicators on the SSBM Control Panel work in conjunction with the event horn to let you know when the Parallel Capacity/Redundant system is operating in any mode other than Normal. Only the Normal indicator is visible during normal Parallel Capacity/Redundant system operation. The others light to indicate alarms or events. When an alarm occurs, you should first check these indicators to see what type of event has taken place. (For descriptions of the status indicators, refer to the “Reading the Status Indicators” section of Chapter 9.)

12.4 System Event Messages

When a system event occurs, a message is added to the Event History Log. A message may also appear on the Monitor Panel of the SSBM or UPM. The Event History Log contains all system event messages, whether or not they were displayed on the Monitor Panel. The following list contains the programmable events displayed on the Active screen of the Monitor panel.

INVERTER ALARMS

- Inverter Failure
- Inverter AC Over Voltage
- Inverter AC Under Voltage
- Inverter Over Frequency
- Inverter Under Frequency
- Inverter DC Over Voltage
- Bypass Phase Rotation
- Inverter Phase Rotation
- Service Required
- UPS Tripped
- Shutdown Imminent
- UPS Off
- Battery Contactor (K2) Failed
- Bypass Contactor (K4) Failed
- Inverter Contactor (K3) Failed
- Bypass Control Failed
- Check Unit Setup
- Bypass Contactor (K4) Fail
- Battery Ground Fault
- 100% Overload Shutdown
- 125% Overload Shutdown
- Over Temperature Shutdown
- Network Sync Failure
- Inverter Calibration Required
- Inverter Setup Required

RECTIFIER ALARMS

- Rectifier Failure
- Rectifier DC Over Voltage
- Rectifier DC Under Voltage
- Input Phase Rotation
- Over Temperature
- Over Temperature Warning
- Temperature Sensor Failure
- Rectifier Calibration Required
- Rectifier Setup Required

MONITOR ALARMS

- Overload Warning
- Load Over 100%
- Load Over 125%
- Battery Test Failed
- Battery Test Failed
- EEPROM Write Failed
- Logic Power Supply Failure
- Fan Failure
- UPS Failure
- Other UPS is On Bypass
- Other UPS Status is Unknown
- Emergency Bypass Failure
- Redundant Module Failure
- Check KW Sensing
- Check Parallel Setup
- Parallel System Overload
- On Battery more than 30 Seconds
- Check UPM Breaker (CBS) AUX
- Check Bypass Breaker (CBP) AUX
- Monitor Calibration Required
- Monitor Setup Required

PNODE ALARMS

PowerNode Board Failure
Bypass Brkr (CBP) Will NOT Open
Bypass Brkr (CBP) Will NOT Close
UPM Breaker (CBS) Will NOT Open
UPM Breaker (CBS) Will NOT Close
Bkfeed Brkr (FBP) Will NOT Open
Bkfeed Brkr (FBP) Will NOT Close
UPM Phase Rotation
Bypass Phase Rotation
PowerNet Channel A RX Down
PowerNet Channel B RX Down
PowerNet Channel A TX Down
PowerNet Channel B TX Down
STSW NOT Available
STSW SCR SHORTED
Load Over 100%
Load Over 125%
STSW Disconnected
K1 Relay Failure
PowerNode Calibration Required
PowerNode Setup Required

UPM ALARMS

UPM 1 Not Reporting

UPM 2 Not Reporting

UPM 3 Not Reporting

UPM 4 Not Reporting

UPM 5 Not Reporting

UPM 6 Not Reporting

UPM 7 Not Reporting

UPM 8 Not Reporting

UPM 1 Alarm

UPM 2 Alarm

UPM 3 Alarm

UPM 4 Alarm

UPM 5 Alarm

UPM 6 Alarm

UPM 7 Alarm

UPM 8 Alarm

UPM 1 Phone Home

UPM 2 Phone Home

UPM 3 Phone Home

UPM 4 Phone Home

UPM 5 Phone Home

UPM 6 Phone Home

UPM 7 Phone Home

UPM 8 Phone Home

INVERTER NOTICES

Input Breaker (CB1) Open
Bypass Mode
Bypass AC Over Voltage
Bypass AC Under Voltage
Bypass Over Frequency
Bypass Under Frequency
Bypass is Not Available
Battery Discharged
Battery DC Under Voltage
Battery Disconnected
Battery Not Charged
Phase A Current Limit
Phase B Current Limit
Phase C Current Limit
Battery Voltage Low
Inv. Logic Power Failure

RECTIFIER NOTICES

Input AC Over Voltage
Input AC Under Voltage
Input Over Frequency
Input Under Frequency
Power Supply Over Voltage
Power Supply Under Voltage
Input Transient
DC Voltage Low
DC Voltage High
Equalizing Battery
Testing Battery
Battery Test Failed
Input/Battery Current Limit
Reduced Input Current Limit
Rct. Logic Power Failure

MONITOR NOTICES

Output AC Over Voltage
Output AC Under Voltage
Output Over Frequency
Output Under Frequency
Three Wire AC Over Voltage
Three Wire AC Under Voltage
Three Wire Under Freq.
PowerNode Network Down
Power Off Switch
Rectifier Network Down
Inverter Network Down
Monitor Network Down
Battery Time Low
Batt Test Requires Calibration
Battery Time Low
Monitor Logic Power Failure
Building Alarm 1 Active
Building Alarm 2 Active
Building Alarm 3 Active
Building Alarm 4 Active
Building Alarm 5 Active
Building Alarm 6 Active
Testing Battery
Battery Test Aborted (load)
Battery Test Aborted (utility)
Battery Passed Test
##Printing Sampled Data
Other UPS Bypass Not Available
Loss of Redundancy

PNODE NOTICES

UPM AC Over Voltage
UPM AC Under Voltage
UPM Over Frequency
UPM Under Frequency
Bypass AC Over Voltage
Bypass AC Under Voltage
Bypass Over Frequency
Bypass Under Frequency
Bypass is Not Available
Not Enough UPMs
System NOT Redundant
PowerNode Calibration Fail
PowerNode Calibration Pass
No Bypass Sync
Check EPO Reset
Pn. Logic Power Failure

13.1 Description

This chapter describes the serial communications feature of the Powerware® 9315 Switchboard System Bypass Module (SSBM). Two serial communications ports on the SSBM allow you to connect equipment to view system event information.

The following sections describe the serial communications feature, and provide information about connecting hardware, setting up the ports, changing settings, and changing modes.

13.2 Locating the Communications Panel

The Customer Interface Panel inside the SSBM contains two serial communications ports, one DB-9 and one DB-25. The ports provide a computer interface to a Remote Monitor Panel (RMP), Relay Interface Module (RIM), Supervisory Contact Module (SCM), or remote terminal and/or printer. The Communications Panel also contains terminals (TB1 thru TB7) for connecting your equipment to the SSBM. Refer to drawings 164201373-4 and 164201373-13 in Appendix A for location of the Customer Interface Panel inside the SSBM.

13.3 Connecting Equipment to a Serial Port

The SSBM is designed to accept a wide variety of Data Communication Equipment (DCE) such as terminals, printers, and computers to each port. Set up the remote equipment using the appropriate parameters for the mode you select. The following section provides more information about configuration.

The cables you use for connection depend on the equipment you are connecting to the SSBM. Cables should be no longer than 16m (50 ft). The connectors for Port 1 and Port 2 on the Communications Panel in the SSBM are female, so the cables into the SSBM should be male. Figure 13-1 shows the pin assignments for Port 1, and Table 13-1 describes them. Figure 13-2 shows the pin assignments for Port 2, and Table 13-2 describes them.

PORT 1 (DB-9)

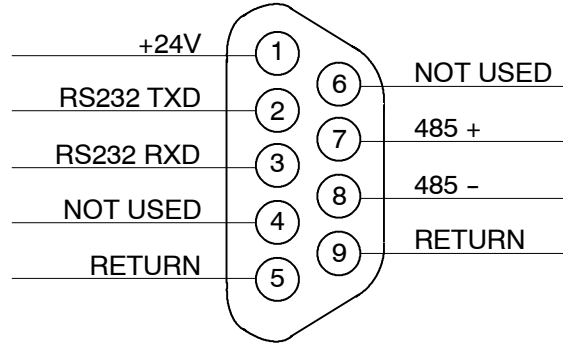


Figure 13–1. Port 1 Pin Assignments

Table 13–1. Pin Assignments for Port 1 (DB–9)			
Pin #	Symbol	Description	Comments
1	+24V	+ 24 volts DC	
2	TXD	Transmit Data	Input to UPS
3	RXD	Receive Data	Output from UPS
5	RTN	Return	
7	485+	RS485 + Data	
8	485–	RS485 – Data	
9	RTN	Return	

PORT 2 (DB-25)

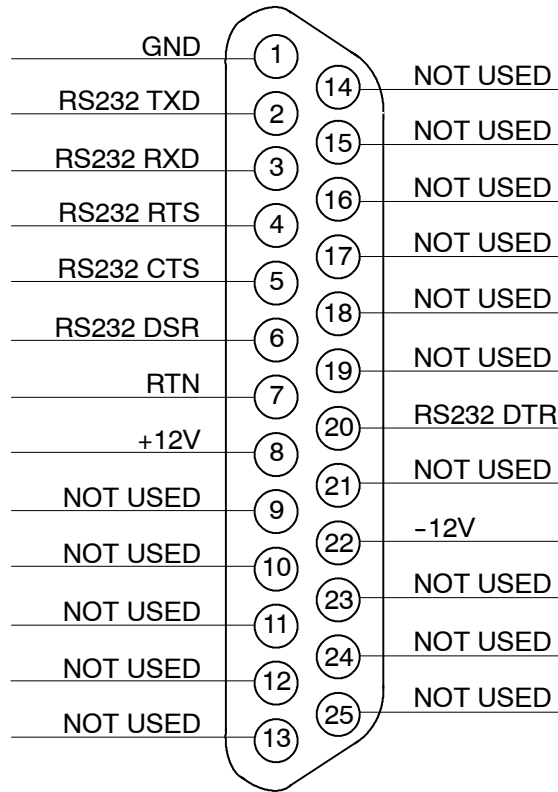


Figure 13–2. Port 2 Pin Assignments

Table 13–2. Pin Assignments for Port 2 (DB–25)			
Pin #	Symbol	Description	Comments
1	GND	Chassis Ground	
2	TXD	Transmit Data	Input to UPS
3	RXD	Receive Data	Output from UPS
4	RTS	Request to Send	Input to UPS
5	CTS	Clear to Send	Output from UPS
6	DSR	Data Set Ready	Output from UPS
7	RTN	Return	
8	+12V	+ 12 volts	Output from UPS – always true
20	DTR	Data Terminal Ready	Input to UPS – typically not used by UPS
22	–12V	– 12 volts	Output from UPS – always true
<i>NOTE: Pins 5 and 6 are tied together internally.</i>			

13.4 Configuring the Serial Ports

You must configure the port for communications using the LCD screen and pushbuttons on the SSBM Monitor Panel.

Select **Port 1** or **Port 2** from the Setup menu to display one of the Setup Port screens. The screens for Port 1 and Port 2 are identical, and allow you to specify settings for the two serial communication ports. Figure 13–3 shows the Setup Serial Port 1 screen.

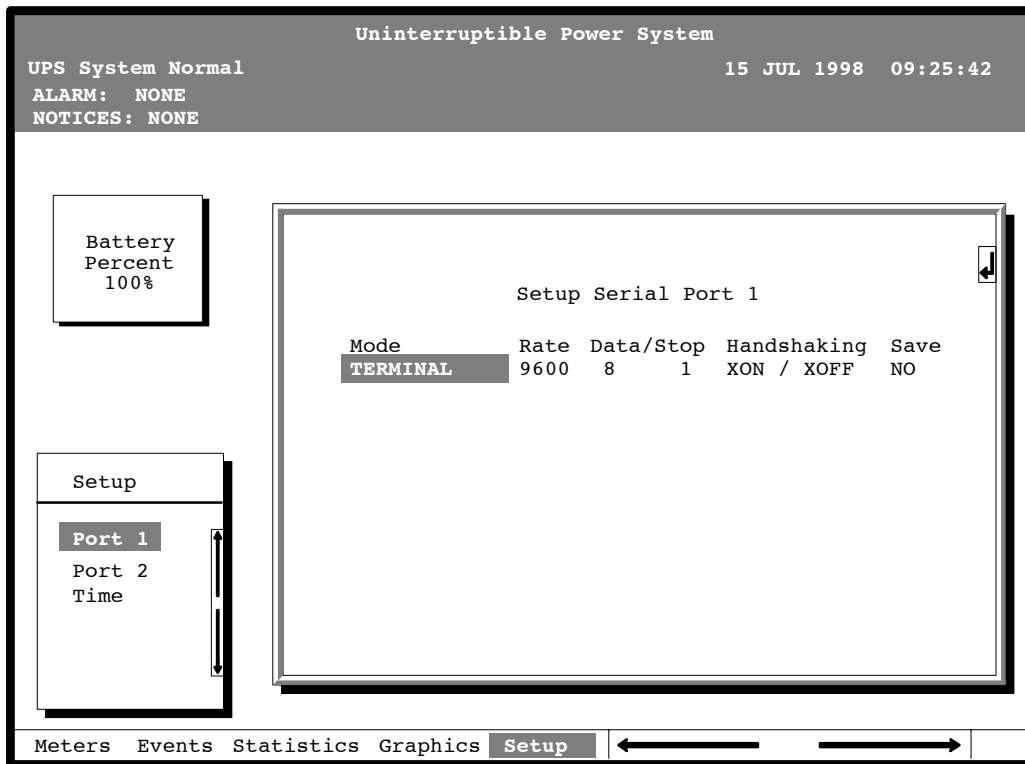


Figure 13–3. Setup Serial Port 1 Screen

A small return arrow (\leftarrow) appears in the upper right corner of the Setup Port screen. This arrow is a reminder that you can press the \leftarrow pushbutton on the Monitor Panel to toggle the pushbuttons between the menu box and the information area.

If the scroll bar is in the menu box, press the \leftarrow pushbutton to toggle to the information area. The first setting (Mode) is highlighted. Press the \leftarrow or \rightarrow pushbutton to move the highlight to the setting you want to change. To scroll through the available options for that setting, press the \uparrow or \downarrow pushbutton.

To save the settings upon exit from this screen, be sure the Save field is set to YES.

Table 13–3 shows which options are available for each port. The sections that follow describe the configuration settings you can change.

Table 13–3. Options Available for Each Communication Port		
Port 1	Port 2	Options
X	X	Terminal Mode
	X	Calibration Mode
X	X	System Configuration
	X	Computer Mode
X		Remote Monitor Mode
X	X	Baud rate of 300, 1200, 2400, 4800, 9600, or 19,200
X	X	Data size/stop bits of 8/1 or 8/2
	X	Data size/stop bits of 7/1 or 7/2
X	X	Disabled handshaking
X	X	XON/XOFF handshaking

13.4.1 Modes

The operational mode of the port. Each communications port operates in one of the following modes:

- Terminal mode** System events are logged immediately as they occur.
- Calibration** Used only by service personnel.
- System Config.** Allows you to set building alarms, battery tests, etc.
(Check with your Sales or Service Representative for availability.)
- Computer** Provides a proprietary Binary Computer Mode (BCM) Interface for Powerware facility monitoring or network communication via ConnectUPS.
- Remote Monitor** Sends all system event information to an RMP, RIM, or SCM.
Available for Port 1 only.

Port 1 and Port 2 cannot be in the same mode simultaneously; they must always be operating in different modes. The modes are described later in this chapter.

13.4.2 Rate

The baud rate of the equipment connected to this port. The baud rate determines the speed of data transferred between the SSBM and the connected equipment. For Remote Monitor mode, the baud rate must be set to 300. All other modes should operate at the highest baud rate available with the connected equipment. 300 baud is not recommended for any mode except Remote Monitor.

You can select a baud rate of 300, 1200, 2400, 4800, 9600, or 19,200.

13.4.3 Data/Stop

The data size and stop bits of the equipment connected to this port. These settings determine the number of bits transmitted per ASCII character. The data size and stop bits you specify depend on the configuration of your equipment.

For Port 1, the data size must be set to 8, with 1 or 2 stop bits. Settings of 7 data bits/1 stop bit and 7 data bits/2 stop bits are available for Port 2.

NOTE: When connecting a computer running a terminal emulation program, you should set your equipment to NO PARITY.

13.4.4 Handshaking

This setting controls handshaking. You can select XON/XOFF or Disabled for this setting.

- **Disabled (No Handshaking)**

If handshaking is disabled, the SSBM transmits and receives data via the serial port, ignoring all inputs from handshaking lines.

- **XON/XOFF**

If handshaking is enabled, the SSBM uses special characters (XON and XOFF) to handshake with the host terminal. The XON character is defined to be ASCII value 11 hex, and the XOFF character is defined to be ASCII value 13 hex. Upon reception of an XOFF command, the SSBM halts transmission until an XON command is received. In the same way, if the terminal receives an XOFF command, the SSBM expects the terminal to halt transmission until the SSBM sends an XON command.

13.4.5 Save

Set to YES to save any changes to configuration settings upon exit from the Setup screen. Set to NO if you do not want to save any changes.

13.4.6 Default Settings

The following are the default configuration settings for the serial communications ports:

Port 1 Remote Monitor 300 baud 8/1 Handshaking Disabled

Port 2 Terminal 9600 baud 8/1 Handshaking Disabled

Each communications port on the SSBM operates in one of five modes which you select when configuring the port using the Setup Port screen.

13.5 Terminal Mode

In this mode, system events are continually logged through the serial port to the device connected to the port. Port 2 operates by default in Terminal mode.

The printed log entries contain a time and date stamp and the alarm text message. Terminal mode uses this format for printing alarm entries:

MMM DD HH:MM:SS.hh KYWD MESSAGE **** <CR> <LF>

<i>Symbol</i>	<i>Description</i>
MM	Month (3 letters)
DD	Day (2 digits)
HH	Hour (2 digits)
MM	Minute (2 digits)
SS	Second (2 digits)
hh	Hundredths of Second (2 digits)
KYWD	Keyword (ALARM, NOTICE, COMMAND, or STATUS)
****	System Diagnostic Information
<CR>	Carriage Return Character (ASCII 13)
<LF>	Line Feed (ASCII 10)

An alarm message is prefixed by the word "CLEAR" whenever an alarm is entered into the Event History Log with a cleared status.

13.5.1 Printing Selected Information

If a port is operating in Terminal mode and is connected to a computer, you can use key combinations at any time to print only selected information:

Ctrl+P	Prints the entire log with a header
Ctrl+M	Prints the current system meters with a header
Ctrl+A	Prints all system information
Ctrl+B	Prints Battery Test Log

To use a key combination, hold down the Control key and press the letter key.

13.5.2 Entire Log (Ctrl + P)

This key sequence prints the entire Event History Log of the SSBM at the time the data is requested. The printout begins with the oldest alarm entry in the queue and ends with the most recent. Any alarms that occur while the Event History Log is printing are included in chronological order.

The Event History Log lists up to 400 system events in chronological order with the most recent event listed last. Figure 13–4 shows a sample Event History Log printout.

```
Uninterruptible Power System

UPS System Normal                03 NOV 1997  14:23:45
Alarm:  None
Notice:  None

Event History Log

Event Description

MAY 12 16:41:19.3  COMMAND: Keyswitch On      0421
      12 16:41:29.1  STATUS:  Auto Mode         1000
      12 16:41:42.4  COMMAND: Rectifier Commanded On  2030
      12 16:42:05.5  STATUS:  Inverter On       2202
      12 16:42:46.8  STATUS:  Rectifier On
      12 16:43:15.8  STATUS:  Inverter Contactor (3) Closed
      12 16:43:42.4  STATUS:  Bypass Contactor (K4) Open
      12 16:44:29.1  STATUS:  Inverter Normal 4001      32

JUN 04 12:16:35.9  NOTICE:  Room High Temperature
```

Figure 13–4. Event History Log

13.5.3 Meters Printout (Ctrl + M)

This key sequence prints the current readings of the SSBM system meters. The Input area shows the phase-to-phase voltage, frequency, and phase current of the incoming utility, followed by the kVA, kW, and power factor measurements. The output area shows the same information for the power being output by the SSBM. The Bypass area shows the phase-to-phase voltage of the bypass source. The Battery area displays the DC voltage (V) and the DC current (I). Figure 13–5 shows a sample Meters printout.

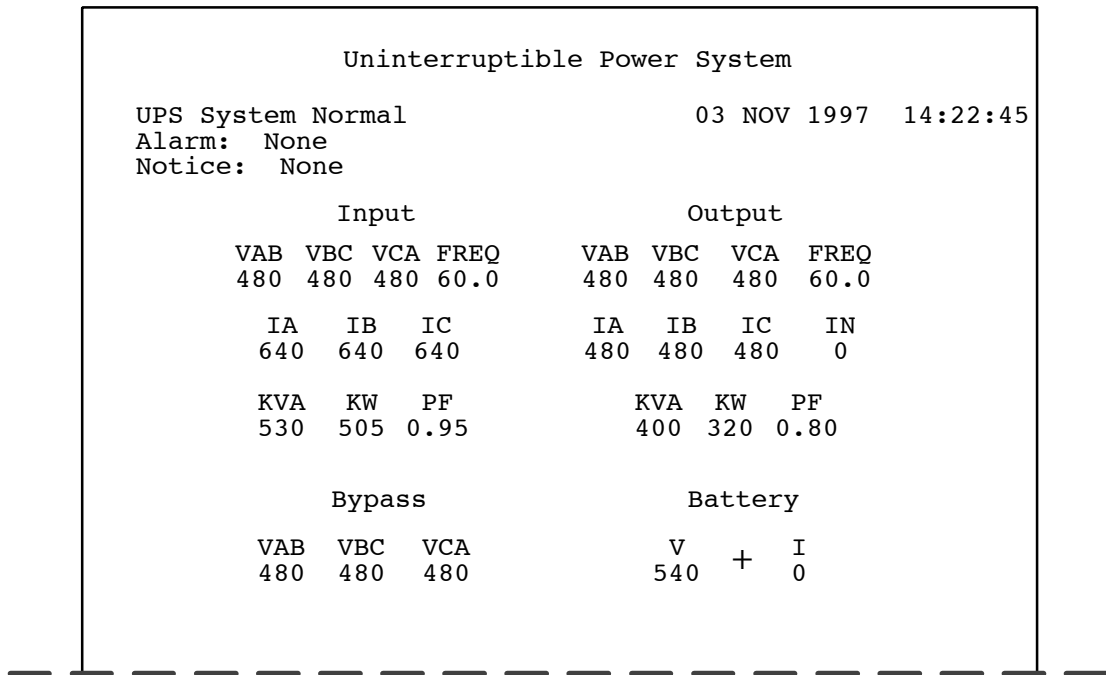


Figure 13–5. System Meters Screen

13.5.4 System Information Printout (Ctrl + A)

This key sequence prints a listing of all available serial data. This printout contains the information shown on the Event History Log and Meters screens of the SSBM (both Figures 13–4 and 13–5).

13.6 System Configuration

The System Configuration mode allows you to modify special functions in your SSBM. These functions include programming of building alarms, customizing building alarm messages, adjusting the nominal output voltage, and scheduling battery tests. The menus provided and their function are described in this section.

13.6.1 System Configuration Mode Main Menu

When the System Configuration mode is selected with a terminal attached, you will be prompted to enter the password for this mode:

Please Enter Password:

The default password is POWER1. You may modify this password using the change password function in the following menu. When the valid password is entered, the main menu will be displayed:

- Program Mode Main Menu
1. Program Building Alarms
 2. Program Unit Name
 3. Adjust Output Voltage
 4. Change Password
 5. Battery Test Setup
 6. Modify Low Battery Time
 7. Exit Program Mode

Enter Selection:

13.6.2 Program Building Alarms

This menu provides access to all the functions available in the system configuration mode. If 1 is entered at the prompt, you can program the building alarm functions:

- Program Building Alarms
1. Enable/Disable Default Functions
 2. Customize Alarm Messages
 3. Return to Main Menu

Enter Selection:

13.6.3 *Enable/Disable Default Functions*

From this menu you may either enable the building alarms for general functions or special functions such as On Generator, Go To Bypass, and Go To UPS. You may also customize the alarm messages from this menu. When 1 is selected from this menu, the following menu is displayed:

Enable/Disable Default Functions

1. Enable/Disable Go To Bypass
2. Enable/Disable Go To UPS
3. Enable/Disable On Generator
4. Enable/Disable Building Alarm
5. Return to Program Building Alarms Menu

Enter Selection:

If you select entry 1–3 from this menu, the following menu will be displayed:

Enable/Disable (*Function*)

Enabled Building Alarm Number(s)

1 4

Enter E# to Enable Building Alarm Number #

Enter D# to Disable Building Alarm Number #

Enter <CR> for No Change

Enter Selection:

Where (*Function*) indicates the function the building alarm is being programmed for. The line following the Enabled Building Alarm Number(s) label indicates which building alarms are currently enabled for the function. (In this example, Building Alarms 1 and 4 are enabled.) A building alarm can only be programmed for one special function at a time from these menus. Enabling a building alarm for a special function automatically enables the alarm. If you disable a special function, the building alarm is also disabled.

If you select entry 4 from this menu, the following menu will be displayed:

Enable/Disable Building Alarm

Enabled Building Alarm Number(s)

1 4

Enter E# to Enable Building Alarm Number #

Enter D# to Disable Building Alarm Number #

Enter <CR> for No Change

Enter Selection:

The line following the Enabled Building Alarm Number(s) label indicates which building alarms are currently enabled. (In this example, Building Alarms 1 and 4 are enabled.)

13.6.4 *Customize Alarm Messages*

If Customize Alarm Messages is selected from the Program Building Alarm menu, you can select a custom message for a building alarm or disable a previously enabled building alarm custom message. When this entry is selected, the following menu is displayed:

```
Customize Alarm Messages
Enabled on Building Alarm Number(s)
2 3
```

Enter Building Alarm Number:

This example indicates that there are custom messages enabled for Building Alarms 2 and 3. When a building alarm number is entered, the message being used by the software is displayed (either a custom message or the default message indicated by the list of enabled custom messages). If 1 was entered at the prompt, the following will be displayed:

```
Building Alarm Active Message: Building Alarm 1 (default message)
```

```
Enter New Message or <CR> for No Change:
```

At this level you can enter a custom message, 30 characters maximum, to display when Building Alarm 1 is activated. If a custom message is entered to activate the building alarm, a custom message should also be entered to deactivate. After the message or a carriage return is entered, the following is displayed:

```
Building Alarm Clear Message: Clear Building Alarm 1 (default message)
```

```
Enter New Message or <CR> for No Change:
```

At this prompt, the user should enter the custom message for the building alarm deactivation state. When a message or a carriage return is entered, the following will be displayed:

```
Enter E to Enable Custom Message
```

```
Enter D to Disable Custom Message
```

```
Enter <CR> for No Change
```

```
Enter Selection:
```

If an E is entered at the prompt, the custom messages will be used for the building alarm. If a D is entered, the default messages will be used for the building alarm.

13.6.5 Program Unit Name

If Program Unit Name is selected from the main menu, the following is displayed:

Program Unit Name

Unit Name:

Enter New Name or <CR> No Change:

NOTE: Unit Name is 45 characters maximum

The current unit name is displayed. This name will be displayed on the second line of the display and in the headers of prints from Terminal mode. If a change is desired, the new unit name should be entered at the prompt. The unit name is 45 characters maximum and includes spaces and any punctuation. If the user wants to center the text portion of the name, the appropriate number of leading spaces should be included when entered.

13.6.6 Change Password

If Change Password is selected from the main menu, the following menu is displayed:

Change Password

Enter New Password:

Verify New Password:

NOTE: Password must be six characters in length.

<CR> to return with no change.

The password will be changed if the user enters and verifies the password. The entry must be six characters.

13.6.7 Battery Test Setup

If Battery Test Setup is selected from the main menu (option 5), the following menu is displayed:

NOTE: *If a message stating “Battery Test Requires Calibration” appears, please notify your service representative for proper calibration.*

Battery Test Setup

1. Setup One-time Delayed Battery Test
2. Setup Monthly Battery Test
3. Setup Quarterly Battery Test
4. Cancel Pending Battery Test
5. Display Next Scheduled Battery Test
6. Return to Main Menu

Enter Selection:

This menu allows you to schedule, review schedule, or cancel pending battery tests. The following menu is displayed when 1–3 is selected:

Enter Starting Month (1–12):

Enter Day of Week, Sunday = 1, (1–7):

Enter Week of Month (1–5):

Enter Hour of Test (0–23):

Enter Minute of Test (0–59):

NOTE: *Follow each entry with <CR>.*

<CR> with no entry will return to Battery Test Setup Menu.

Enter the information at the prompt with a carriage return to schedule the battery test.

If entry 4 is selected from the Battery Test Setup menu, you will be prompted to enter “Y” to cancel all pending tests. This selection will only cancel pending tests and will not stop a test currently in progress.

If entry 5 is selected from the Battery Test Setup menu, and if a Battery Test is scheduled, the following menu is displayed:

Next Battery Test Scheduled

WK DAY MON HR:MN

4 FRI MAR 15:34

NOTE: *Enter <CR> to return to Battery Test Setup Menu.*

If 5 is selected and there are no tests scheduled, the following will be displayed:

No Battery Test Scheduled

Enter <CR> to return to Battery Test Setup Menu

NOTE: *The unit will only perform one battery test in any 24 hour period.*

13.6.8 Modify Low Battery Time

This menu allows you to modify the low battery time warning. When selected, the following menu will be displayed:

Modify Low Battery Time

Low Battery Time (Minutes): 004

Enter New Low Battery Time:

NOTE: *Low Battery Time should be no greater than 999. Enter <CR> to return with no change.*

Enter the new time desired to change the warning level.

13.7 Calibration Mode

Calibration mode is used by factory and field service personnel to calibrate system meters. Factory test engineers calibrate the SSBM meters prior to shipping so the SSBM arrives at your site correctly calibrated. After use, field service personnel may need to use Calibration mode to recalibrate one or more meter settings.

NOTE: *Calibration mode is for use by service personnel ONLY. To prevent inadvertent modification, this mode can be accessed only by trained personnel.*

13.8 Computer Mode

This mode provides a computer interface which gives your system compatibility with system monitoring and network products. For a list of products available, contact your sales representative.

13.9 Remote Monitor Mode

This mode provides the interface for the RMP, RIM, or SCM described earlier.

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14.1 Description

Remote Notification provides the user with the option of receiving alarms and notices at a remote location. Remote Notification operates through a standard computer modem. Using the Terminal mode, the user calls the Switchboard System Bypass Module (SSBM) to perform basic monitoring. In the event of a SSBM alarm or notice, the user is notified at the remote location. The SSBM calls, through the modem, to the user's computer or pager and leaves a message.

Remote Notification is an extension of the Terminal mode with the additional support algorithms necessary to control an external modem (refer to Chapter 13, "Serial Communications"). Connection to the SSBM is made when a user calls the SSBM on the phone. The user has exactly the same capabilities as if using a terminal connected directly to the SSBM RS-232 port. Remote Notification differs from the basic Terminal mode with the addition of Call Answer, Call Out, and Housekeeping functions. The Call Answer function allows the user to call into the SSBM from a remote location and enter Terminal mode. The Call Out function allows the SSBM to be configured to call either a remote computer or numeric paging service over the phone line. Call Out allows the SSBM to call a remote computer and leave a one-line descriptive message of the alarm or notice condition. Numeric paging support allows the SSBM to call a paging service and send numeric messages. The Housekeeping function maintains the link between the SSBM and modem.

14.2 Remote Notification Features

Remote Notification provides the SSBM with the capability to utilize a standard off-the-shelf PC modem as a telephone interface. The features provided by this option are as follows:

- Call out to a remote terminal or pager based on programmable events and alarms.
- Two separate, programmable notification groups (phone numbers).
- Programmable number of redial attempts.
- Programmable time delay between call out attempts.
- Automatic answering (user configurable) for access to the Terminal mode of the SSBM.
- Remote and local ability to clear Call Out alarms and events.
- Error detection and correction for misconfigured and disconnected modems.
- Uses standard modems and null modem cables available at your local computer supply center.

NOTE: *Programmable functions are to be set by Powerware Corporation authorized personnel only.*

14.3 Description of Operation

The Remote Notification option performs three basic functions: Call Answer into Terminal mode, Call Out to a remote terminal, and Housekeeping. Remote Notification also allows access to any functions available in the Terminal mode from a remote computer or terminal.

14.3.1 Call Answer

When the modem receives a call, the SSBM is alerted to wait for a connect signal from the modem. When the modem answers and finishes handshaking, the SSBM acknowledges the modem connect signal and allows the caller into the Terminal mode (refer to Chapter 13, “Serial Communications”). In this mode, the user can request four items and perform one command:

NOTE: *The brackets ([]) in the following steps indicate standard keyboard characters.*

- Display all screens (^B, ^M, ^P). Press and hold [CTRL], then press [A].
- Display battery test results by pressing and holding [CTRL], then pressing [B].
- Display meters screen by pressing and holding [CTRL], then pressing [M].
- Display event history by pressing and holding [CTRL], then pressing [P].
- Reset Call Out Alarms by pressing and holding [CTRL], then pressing [R].

The Reset Call Out Alarms command causes the SSBM to cease Call Out attempts on a currently active alarm and resets that alarm call. Refer to the “Call Out” section of this chapter for more information when calling a pager or if a failed connection to a PC terminal.

14.3.2 Call Out

The Call Out function contains programmable alarms (setup by service personnel) and status events (refer to Chapter 12, “Responding to System Events”). The notification groups tell the SSBM to notify a remote computer or pager for each selected event. Refer to the “Configuring the Modem” section of this chapter for information on the modem configuration. Refer to the “User-Selected Events” section of this chapter to note which events are designated as group one or two. These events are selected when the SSBM is purchased. The Call Out function activates as follows:

- A SSBM alarm or notice occurs that is programmed to cause a Call Out.
- The SSBM takes the modem off the hook and sends a command to the modem to call the notification groups (phone numbers) required. The phone are stored in the modem only. The command sent to the modem for group one is “ATDS0” and “ATDS1” for group two. This allows the user to program the desired phone numbers into the modem.
- The SSBM logs a successful notify to the event log when the remote computer or modem answers and leaves an event message with the following format.

nnn<space>mmm<LF><CR> where:

nnn	=	UPS_Remote_Notification–Default (40 characters maximum)
<space>	=	ASCII space character (0x20)
mmm	=	Event message for notice or alarm (40 characters maximum)
<LF>	=	ASCII line feed character (0x0A)
<CR>	=	ASCII carriage return character (0x0D)

If calling a pager service and the service answers, the modem can delay momentarily and before dialing the pager number. Refer to “Configuring the Modem to Call a Numeric Pager” section of this chapter for more information.

NOTE: *Because the pager service is not a modem, the SSBM does not know if its message got through; therefore, the SSBM continues to call the pager service for a programmed number of times or until a call-in reset is performed or the key on the front panel is reset. An unsuccessful notify event is logged into the SSBM event log for each attempted call out.*

If the phone number that the SSBM is calling does not answer, the SSBM delays for a time period (programmable from 1 to 60 minutes) and then reattempts the call. If answered, the SSBM ceases further attempts to call. Each unsuccessful attempt to call causes an unsuccessful notify event to be logged into the SSBM event log.

If both call groups are active, the SSBM alternates between calling the groups. The Call Out process can be terminated at any time by calling into the SSBM and sending the reset command (press and hold [CTRL] and press [R]) or by turning the key switch on the front of the SSBM.

14.3.3 Housekeeping

When the modem is idle, the SSBM “pings” (tests for connection) the modem by sending an “AT” to the modem at five-minute intervals. If the modem does not respond correctly, by sending either “OK” or “0” to the SSBM, the SSBM attempts to re-initialize the modem. After a successful re-initialization, the SSBM returns to the Housekeeping function. If the re-initialization is unsuccessful, two more attempts to re-initialize the modem are made before the SSBM disables all Call Out attempts. Re-initialization is then attempted every ten minutes or until the communications mode is changed by the SSBM front panel controls (or the modem is successfully re-initialized). For each unsuccessful attempt, the SSBM logs a modem failure event into the event log. When the modem link is confirmed, the SSBM communications resume normal operation and Call Out is enabled.

14.4 Hardware Requirements

The following hardware components are required to connect the Remote Notification function.

- Modem: Basic external PC modem supporting the following AT commands.
 - T – Tone dialing.
 - &F – Load factory defaults.
 - E0 – Do not echo characters in command state.
 - N0 – Handshake only at speed specified by S37.
 - Q0 – Return result codes in both originate and answer mode.
 - V0 – Display result codes as numbers.
 - X0 – Provide basic result codes: CONNECT, NO CARRIER, and RING.
 - &D0 – Ignore status of DTR signal.
 - &K0 – Disable local flow control.
 - &Q5 – Communicate in error control mode.
 - S0=1 – Auto Answering.
 - S37=6 – 2400 Baud.
 - V0 – Store setup in profile O.
 - Y0 – Recall profile O on power up.

NOTE: Consult the modem manufacturer’s manual to confirm that the above commands are supported by your modem.

- Standard serial cable with a male DB25 connector on both ends.
- DB25 null modem adapter.

All the above items can be acquired at your local computer products supply store.

An alternative to purchasing a cable is to build your own serial cable using the following pin out description:

Male DB25	Male DB25
pin 7	pin 7
pin 2	pin 2
pin 3	pin 2

14.5 Configuring the Modem

The modem must be programmed with the Call Out telephone numbers in order to operate the Remote Notification option.

To configure the modem, connect the serial port of a standard PC computer to the modem through the serial cable. Run a terminal emulation program on the computer. Test the connection to the modem by typing [A], [T] and [ENTER]. The modem should respond with either "OK" or "0" (zero). If the modem does not respond, consult the modem manufacturer's manual to confirm your setup. If the modem still does not respond, then seek technical assistance from your modem manufacturer.

After connection, perform "Basic Modem Configuration" and the remaining sections of this chapter.

14.5.1 Basic Modem Configuration

The basic modem should be a plug and play type. All setup is done by the UPS. Only the initial phone number needs to be entered by the user.

14.5.2 Configuring the Modem to Call a Remote Computer

To configure the modem to call a remote computer, perform the following procedure:

NOTE: The brackets ([]) in the following steps indicate characters that require keying in prior to pressing [ENTER].

1. Connect the modem to the PC through the serial port as described in the modem manufacturer's manual .
2. Key in [A], [T], then press [ENTER].
3. Confirm that the modem responds with "OK" or "0" (zero).

NOTE: In steps 4 and 5, the "xxxxxx" is the phone number of a remote computer. The phone number should include all local line and long distance access numbers needed to dial out. This number is limited to 32 characters. For example, use "9" if needed for an outside line, "1" for long distance + (Area Code) + Number or whatever access codes are needed to dial the call directly. Add a "," in the number anywhere that a delay is needed. This will cause a one-second delay. More than one delay may be added to the number; for example, enter "AT&Z0=T,9,,1 (Area Code) (Phone Number)".

4. To program a group one number, key in [A], [T], [&], [Z], [0] (zero), [=], [T], [,], [xxxxxx], then press [ENTER].
5. To program a group two number, key in [A], [T], [&], [Z], [1], [=], [T], [,], [xxxxxx], then press [ENTER].
6. Confirm that the modem responds with "OK" or "0" (zero).
7. Key in [A], [T], [&], [W], [0] (zero), then press [ENTER].
9. Confirm that the modem responds with "OK" or "0" (zero).
8. Key in [A], [T], [&], [Y], [0] (zero), then press [ENTER].
9. Confirm that the modem responds with "OK" or "0" (zero).
10. Connect a telephone line to the modem and test the modem by keying in [A], [T], [D], [S], = [0] (zero), then pressing [ENTER].
11. The modem dials the telephone number stored in step 4. (The number is displayed on the terminal screen as it is dialed.) Repeat steps 4 through 9 as necessary to modify the telephone number.
12. Confirm that the modem responds with "1" (one) or "Connect" when the connection is made.

NOTE: To set up a group one or group two pager number, refer to "Configuring the Modem to Call a Numeric Pager" section of this chapter.

14.5.3 Configuring the Modem to Call a Numeric Pager

To configure the modem to call a numeric pager system, perform the following procedure.

NOTE: *The brackets ([]) in the following steps indicate characters that require keying in prior to pressing [ENTER].*

1. Connect the modem to the PC through the serial port as described in the modem manufacturer's manual .
2. Key in [A], [T], then press [ENTER].
3. Confirm that the modem responds with "OK" or "0" (zero).

NOTE: *In steps 4 and 5 the "xxxxxxx" is the pager system number and "yyyyyy" is the numeric message (usually a phone number). The three "[,]" provide a delay while the pager system computer answers. The "xxxxxxx" entry should include all local line and long distance access numbers needed to dial out, as well as the pause necessary between dialing the pager service and sending the pager the numeric message. This number is limited to 32 characters. For example, use "9" if needed for an outside line, "1" for long distance + (Area Code) + Number or whatever access codes are needed to dial the call directly. Add a "," in the number anywhere that a delay is needed. This causes a one-second delay. More than one delay may be added to the number; for example, enter "AT&Z0=T,9,,1 (Area Code) (Phone Number) (Pauses) (Numeric Message)". For areas with pulse dialing, the "T" should be inserted before the numeric message to switch to tone dialing. The numeric message can only be delivered using tone dialing. Keying in the "#" (pound) character at the end of the numeric message is very important. It prevents the pager service from picking up on the modem hang-up commands and sending additional characters.*

4. To program a group one number, key in [A], [T], [&], [Z], [0] (zero), [=], [T], [,], [xxxxxxx], [,], [,], [,], [yyyyyy], [#], then press [ENTER].
5. To program a group two number, key in [A], [T], [&], [Z], [1], [=], [T], [,], [xxxxxxx], [,], [,], [,], [yyyyyy], [#], then press [ENTER].
6. Confirm that the modem responds with "OK" or "0" (zero).
7. Key in [A], [T], [&], [W], [0] (zero), then press [ENTER].
6. Confirm that the modem responds with "OK" or "0" (zero).
7. Key in [A], [T], [&], [W], [0] (zero), then press [ENTER].
8. Confirm that the modem responds with "OK" or "0" (zero).
9. Connect a telephone line to the modem and test the modem by keying in [A], [T], [D], [S], [0] (zero), then pressing [ENTER].
10. The modem dials the telephone number stored in step 4 or step 5. (The number is displayed on the terminal screen as it is dialed.) Confirm that the pager receives the message. Repeat steps 4 (or 5) through 9 as required to modify the telephone number and message.

NOTE: *To set up a group one or group two number to call a computer, refer to "Configuring the Modem to Call a Remote Computer" section of this chapter.*

14.5.4 Final Modem Configuration

The final step in configuring the PC modem for use with the SSBM is to turn off the echo feature of the modem. Perform the following procedure.

NOTE: The brackets ([]) in the following steps indicate characters that require keying in prior to pressing [ENTER].

1. Connect the modem to the PC as described in the modem manufacturer's manual .
2. Key in [A], [T], then press [ENTER].
3. Confirm that the modem responds with "OK" or "0" (zero).
4. Key in [A], [T], [E], [0] (zero), then press [ENTER].
5. Confirm that the modem responds with "OK" or "0" (zero).
6. Key in [A], [T], then press [ENTER].
8. Confirm that the modem responds with "OK" or "0" (zero) and that the "AT" is not echoed back to the terminal.
9. Key in [A], [T], [&], [W], [0] (zero), then press [ENTER].
10. Confirm that the modem responds with "OK" or "0" (zero).

14.6 SSBM Setup Configuration

Connect the modem to the SSBM by connecting one end of the serial cable to the UPS Port 2 DB–25F connector and the other to the modem (refer to Chapter 13, “Serial Communications”). If using a standard serial cable, a null modem adapter is required for the connection to the modem.

The Powerware 9315 SSBM can only use serial Port 2, DB–25F, for the Remote Notification option. This connection is located on the Customer interface Panel at the top right of the SSBM cabinet.

The remote modem operates at only 2400 baud.

Following the instructions in Chapter 9, “Using the Control Panel” and Chapter 13, “Serial Communications”, use the LCD screen and pushbuttons on the Monitor Panel to access the setup screen and configure Port 2 as follows.

NOTE: *The modem should be connected to the SSBM as described in the modem manufacturer’s manual before configuring the SSBM communications port.*

<MODE>	Remote Notify
<RATE>	The baud rate at which the modem will communicate to other modems, 2400 baud.
<DATA/STOP>	8 1 Standard 8 data bits, 1 stop bit, no parity.
<HANDSHAKING>	Disabled
<SAVE>	Yes. To save new configuration.

The handshaking feature listed is for SSBM-to-terminal handshaking, not SSBM-to-modem handshaking. Setting the handshaking to “modem” has no effect. If the remote terminal has buffering problems because of excessive data transfer rate from the SSBM, XON/XOFF handshaking can be selected to resolve this issue. The user must make sure that the modem (not the remote terminal) at the remote terminal end of the connection is configured for either hardware handshaking or none at all. This is required so that the modem does not attempt to trap the XON/XOFF characters and prevent them from being transmitted to the SSBM.

14.6.1 User Selected Events

Insert a check at each alarm or notice in the appropriate Group 1 or Group 2 block to indicate the configuration of your SSBM.

INVERTER MESSAGES – ALARMS	Group 1	Group 2	INVERTER MESSAGES – NOTICES	Group 1	Group 2
Inverter AC Over Voltage			Inv. Logic Power Failed		
Inverter AC Under Voltage			Bypass AC Over Voltage		
Inverter Calibration Required			Bypass AC Under Voltage		
Inverter Contactor (K3) Failed			Bypass is Not Available		
Inverter DC Over Voltage			Bypass Mode		
Inverter Failure			Bypass Over Frequency		
Inverter Over Frequency			Bypass Under Frequency		
Inverter Phase Rotation			Input Breaker (CB1) Open		
Inverter Setup Required			Battery Contactor (K2) Open		
Inverter Under Frequency			Battery DC Under Voltage		
100% Overload Shutdown			Battery Discharged		
125% Overload Shutdown			Battery Not Charged		
Over Temperature Shutdown			Battery Voltage Low		
Shutdown Imminent			Phase A Current Limit		
Load Off			Phase B Current Limit		
Bypass Contactor (K4) Failed			Phase C Current Limit		
Battery Contactor (K2) Failed			Phase C Current Limit		
Bypass Control Failed					
Bypass Phase Rotation					
Go To Bypass Active					
Battery Ground Fault					

RECTIFIER MESSAGES – ALARMS	Group 1	Group 2	RECTIFIER MESSAGES – NOTICES	Group 1	Group 2
Input Phase Rotation			Battery Test Failed		
Over Temperature			DC Voltage High		
Over Temperature Warning			DC Voltage Low		
Rectifier Calibration Required			Equalizing Battery		
Rectifier DC Over Voltage			Input AC Over Voltage		
Rectifier DC Under Voltage			Input AC Under Voltage		
Rectifier Failure			Input Over Frequency		
Rectifier Setup Required			Input Transient		
Temperature Sensor Failure			Input Under Frequency		
			Input/Battery Current Limit		
			Logic Power Failed		
			Power Supply Over Voltage		
			Power Supply Under Voltage		
			Rectifier 1.12		
			Reduced Input Current Limit		
			Testing Battery		

MONITOR MESSAGES – ALARMS	Group 1	Group 2	MONITOR MESSAGES – NOTICES	Group 1	Group 2
Battery Test Failed			Battery Passed Test		
Battery Test Failed			Battery Test Aborted (load)		
Fan Failure			Battery Test Aborted (utility)		
Load Over 100%			Battery Test Requires Calibration		
Load Over 125%			Battery Time Low		
Monitor Calibration Required			Building Alarm 1 Active		
Monitor Setup Required			Building Alarm 2 Active		
Overload Warning			Building Alarm 3 Active		
Power Supply Failure			Building Alarm 4 Active		
			Building Alarm 5 Active		
			Building Alarm 6 Active		
			Inverter Network Down		
			Monitor Logic Pwr Fail		
			Monitor Network Down		
			No Active Events		
			Output AC Over Voltage		
			Output AC Under Voltage		
			Output Over Frequency		
			Output Under Frequency		
			Power Off Switch		
			Rectifier Network Down		
			Testing Battery		
			Three Wire AC Over Voltage		
			Three Wire AC Under Voltage		
			Three Wire Over Freq.		
			Three Wire Under Freq.		

Maintaining the Parallel Capacity/Redundant System

15

15.1 General

You must schedule periodic performance checks of your Parallel Capacity/Redundant system to keep it running properly. Regular routine checks of operation and system parameters will enable your system to function efficiently for many trouble-free years.

NOTE: Refer to the applicable Powerware® 9315 Operation manual provided with the UPS for UPS maintenance.

15.2 Important Safety Instructions

Remember that your Parallel Capacity/Redundant system is designed to supply power **EVEN WHEN DISCONNECTED FROM THE UTILITY POWER**. The UPS module interiors are unsafe until the DC power source is disconnected and the electrolytic capacitors are discharged. The SSBM is unsafe until the UPS modules have been powered down and bypass power has been removed. After disconnecting the utility power and the DC power, authorized service personnel should wait at least 5 minutes before attempting internal access to the UPS module.

WARNING:
Servicing and maintenance should be performed by qualified service personnel only.

WARNING: LETHAL VOLTAGE PRESENT.
This unit should not be operated with the cabinet doors open or protective panels removed. Do not make any assumptions about the electrical state of any cabinet in the UPS system.

Since each battery rack is an energy source in itself, opening the Battery Circuit Breaker does not de-energize the voltage within the battery rack. **DO NOT ATTEMPT TO ACCESS ANY INTERNAL AREA OF THE BATTERY RACK YOURSELF. VOLTAGES ARE ALWAYS PRESENT IN THE BATTERY RACK.** If you suspect that a battery rack needs service, you should contact your local Powerware field service office.

If the rack requires service, refer to the battery rack manufacturer's operating manual for instructions on battery rack maintenance, or contact your local Powerware field service office.

Observe these precautions when working on or around battery racks:

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries or battery cabinets.
- Disconnect the charging source prior to connecting or disconnecting terminals.
- Determine if the battery is inadvertently grounded. If it is, remove the source of the ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance.
- When replacing batteries, use the same number of sealed, lead-acid batteries.
- Proper disposal of batteries is required. Refer to your local codes for disposal requirements.

WARNING: HAZARDOUS WASTE.
Do not incinerate or dispose of batteries indiscriminately. Observe local and national codes.

WARNING:
Do not dispose of battery or batteries in a fire. The battery may explode.
Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes, and may be toxic.
A battery can cause electrical shock, burn from high short-circuit current, or fire. Observe proper precautions.

ATTENTION:
Une batterie peut présenter un risque de choc électrique, de brûlure, ou d'incendie. Suivre les précautions qui s'imposent.

- Pour le remplacement, utiliser le même nombre et modèle des batteries.
- L'élimination des batteries est réglementée. Consulter les codes locaux à cet effet.



15.3 Performing Preventive Maintenance

The Parallel Capacity/Redundant system requires very little preventive maintenance. However, the system should be inspected periodically to verify that the units are operating normally and that the batteries are in good condition.

Perform the following checks DAILY:

- Check the area surrounding the Parallel Capacity/Redundant system. Ensure the area is not cluttered, allowing free access to the unit.
- Ensure the air intakes (vents on the front doors) and exhaust opening (on top of the UPS cabinet and SSBM) are not blocked.
- Ensure there is at least six inches of clearance behind the unit for proper air circulation.
- Ensure the operating environment is within the parameters specified in Chapter 16, "Product Specifications."
- Ensure the SSBM and UPS modules are in Normal mode (Normal status indicator is lit). If alarm lamps are lit or the Normal status indicators are not lit, contact Powerware Customer Support.

Perform the following checks MONTHLY:

- Ensure all status indicator lamps are operative. (Press the  and  pushbuttons simultaneously to test the lamps.)
- Monitor system parameters as described in Chapter 9, "Using the Control Panel."
- Check the air filters in UPS modules (located behind the front doors) and replace them as necessary. The filter size is 16 in. x 20 in. x 1 in.
- Record the results of your checks and any corrective actions in a suitable log.

ANNUAL maintenance:

Annual preventive maintenance should be performed only by authorized service personnel familiar with maintenance and servicing of the Parallel Capacity/Redundant system. Contact your nearest Powerware field service office for more information about service offerings.

BATTERY maintenance:

Contact your nearest Powerware field service office for battery maintenance. Battery replacement and maintenance should be performed only by authorized service personnel.

15.4 Short Circuits

Normally, the overcurrent protective device on the circuit will prevent any electrical damage except at the actual point of short-circuit. A thorough inspection of the entire system after any large fault current should be made to ensure that there has been no mechanical damage to conductors, insulation, or equipment.

In addition, the individual overcurrent protective device or devices which performed the short-circuit interruption must be inspected for possible arcing damage to contacts, arc chutes and/or insulation.

15.5 Circuit Breakers

Refer to General Electric Document GEH-6271, *Installation Instructions for PowerBreakII Circuit Breakers/DrawOut 800-4000 Ampere Frames*, for recommended circuit breaker maintenance.

15.6 Maintenance Training

A basic training course, available from Powerware Corporation, gives you a competent working knowledge of the Parallel Capacity/Redundant system operation and teaches you how to perform first level corrective maintenance. For more information about training and other services, contact the Powerware Corporation Training Coordinator in Raleigh, North Carolina, or call Powerware Corporation field service at **1-800-843-9433**.

16.1 Model Numbers

The Switchboard System Bypass Module (SSBM) is housed in a freestanding switchboard. The SSBM is available in both 50 Hz and 60 Hz, with various current ratings:

System	Model
Powerware® 9315 2500 SSBM	2500
Powerware® 9315 3000 SSBM	3000
Powerware® 9315 4000 SSBM	4000

The following sections detail the input, output, and environmental specifications for the SSBM.

16.2 SSBM Input

Input Voltage (UPM Dependent)	208 VAC nominal (60 Hz only) 220 VAC nominal (60 Hz only) 380 VAC nominal (50/60 Hz) 400 VAC nominal (50/60 Hz) 415 VAC nominal (50/60 Hz) 480 VAC nominal (60 Hz only) 600 VAC nominal (60 Hz only)
Input Frequency Range	±3 Hz of nominal (50 Hz or 60 Hz)
Input Current	Model 2500: 2500 Amps Model 3000: 3000 Amps Model 4000: 4000 Amps

16.3 SSBM Output

Output Voltage (UPM Dependent)	208 VAC nominal (60 Hz only) 220 VAC nominal (60 Hz only) 380 VAC nominal (50/60 Hz) 400 VAC nominal (50/60 Hz) 415 VAC nominal (50/60 Hz) 480 VAC nominal (60 Hz only) 600 VAC nominal (60 Hz only)
Output Frequency Range	±3 Hz of nominal (50 Hz or 60 Hz)
Output Current	Model 2500: 2500 Amps Model 3000: 3000 Amps Model 4000: 4000 Amps
Overload Capability	Alarm only. Trip Delay customer adjustable in accordance with breaker manufacturer specifications.

16.4 Environmental Specifications

Operating Temperature	0 to 25°C without derating. The recommended operating temperature is 25°C.
Operating Altitude	Maximum 1500m (5000 ft) at 40°C without derating
Storage Temperature	-20 to +70°C (prolonged storage above 40°C will cause rapid battery self-discharge)
Relative Humidity (operating and storage)	95% maximum noncondensing
Acoustical Noise	N/A
EMI Suppression	Meets FCC Regulation 47, Part 15, Subpart J, for class A devices
Electrostatic Discharge (ESD) Immunity	Meets IEC 801-2 specifications. Withstands up to 25 kV without damage and with no disturbance or adverse effect to the critical load.

Appendix A – Customer Information

The information in this appendix will help you plan for and install your UPS system. This appendix contains the following drawings:

- 164201373–1 Installation Notes
- 164201373–2 Typical Parallel Capacity/Redundant System with SSBM
- 164201373–3 Oneline Drawing of Typical Parallel Capacity/Redundant System
- 164201373–4 SSBM Customer Interface Panel
- 164201373–5 UPM PowerNet Interface Panel:
Powerware 9315–200 to –500 UPMs
- 164201373–6 UPM CAN Interface: Powerware 9315 625/750 UPMs
- 164201373–7 Remote Emergency Power Off
- 164201373–8 Remote Monitor Panel
- 164201373–9 Relay Interface Module
- 164201373–10 Supervisory Contact Module
- 164201373–11 PowerHandlerPlus SSBM
- 164201373–12 PowerHandlerPlus SSBM with SMB
- 164201373–13 Typical SSBM Control Section
- 164201373–14 UPM Output-to-SSBM Cable and Conduit Configurations

**Table A. INPUT/OUTPUT Ratings & External Wiring Requirements for
Powerware 9315 Switchboard System Bypass Module (SSBM):3P3W
(Output Neutral Not Used)**

Ratings		Units	Rating		
		SSBM Model	2500	3000	4000
		Maximum Amps	2500	3000	4000
AC INPUT (Note 5)	AC Input from UPS to SSBM CBS Breaker <i>Minimum conductor size, 3Ø, (1) neutral, (1) gnd (number per Ø and neutral)</i>	AWG or kcmil(ea)	Refer to Table R for minimum conductor sizes.		
AC INPUT	AC Input to SSBM Bypass <i>Full Load Current minimum conductor size, 3Ø, (1) gnd (number per Ø)</i>	AWG or kcmil(ea)	500 (6)	500 (7)	500 (9)
AC INPUT (Note 2)	AC Input to optional SMB Bypass <i>Full Load Current minimum conductor size, 3Ø, (1) gnd (number per Ø)</i>	AWG or kcmil(ea)	500 (6)	500 (7)	500 (9)
AC OUTPUT	AC Output from SSBM to Load Bank <i>Full Load Current minimum conductor size, 3Ø, (1) gnd (number per Ø)</i>	AWG or kcmil(ea)	500 (6)	500 (7)	500 (9)
AC OUTPUT	AC Output from SSBM or optional SMB to Critical Load <i>Full Load Current minimum conductor size, 3Ø, (1) gnd (number per Ø)</i>	AWG or kcmil(ea)	500 (6)	500 (7)	500 (9)

**Table B. INPUT/OUTPUT Ratings & External Wiring Requirements for
Powerware 9315 Switchboard System Bypass Module (SSBM):3P4W
(Output Neutral Used)**

Ratings		Units	Rating		
		SSBM Model	2500	3000	4000
		Maximum Amps	2500	3000	4000
AC INPUT (Note 5)	AC Input from UPS to SSBM CBS Breaker <i>Minimum conductor size, 3Ø, (1) neutral, (1) gnd (number per Ø and neutral)</i>	AWG or kcmil(ea)	Refer to Table R for minimum conductor sizes.		
AC INPUT	AC Input to SSBM Bypass <i>Full Load Current minimum conductor size, 3Ø, (1) neutral, (1) gnd (number per Ø and neutral)</i>	AWG or kcmil(ea)	500 (7)	600 (8)	600 (11)
AC INPUT (Note 12)	AC Input to optional SMB Bypass <i>Full Load Current minimum conductor size, 3Ø, (1) neutral, (1) gnd (number per Ø and neutral)</i>	AWG or kcmil(ea)	500 (7)	600 (8)	600 (11)
AC OUTPUT	AC Output from SSBM to Load Bank <i>Full Load Current minimum conductor size, 3Ø, (1) neutral, (1) gnd (number per Ø and neutral)</i>	AWG or kcmil(ea)	500 (7)	600 (8)	600 (11)
AC OUTPUT	AC Output from SSBM or optional SMB to Critical Load <i>Full Load Current minimum conductor size, 3Ø, (1) neutral, (1) gnd (number per Ø and neutral)</i>	AWG or kcmil(ea)	500 (7)	600 (8)	600 (11)

NOTE: Callout letters **A**, **B**, **C**, **D**, and **E** map to drawing #164201373-3

DESCRIPTION:

INSTALLATION NOTES

DRAWING NO:

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Read and understand the following notes while planning your installation:

1. Refer to national and local electrical codes for acceptable external wiring practices.
2. Material and labor for external wiring requirements are to be provided by designated personnel.
3. For external wiring, use 90°C copper wire.
See the appropriate column in Tables A, B, and O.
4. Refer to the appropriate UPS installation manual for UPS module and optional equipment installation notes.
5. A bypass neutral feeder must be installed when the output neutral is used. If no bypass neutral is installed, the output neutral is to be bonded to the chassis in the SSBM through a minimum size copper conductor listed in Table H on Sheet 3 of Drawing 164201373–3. In either case, fully rated neutral conductors are to be run from the output of each UPM to the neutral buss bar inside the SSBM.

NOTE: *The required neutral conductors must be spread evenly as possible between the available neutral runbacks.*

6. External overcurrent protection is not provided by this product, but is required by codes. Refer to Tables A, B, and O for wiring requirements. If an output lockable disconnect is required, it is to be supplied by designated personnel.
7. Terminals E1 through E17 are 2-hole bus bar mountings for standard NEMA 2-hole barrel lugs. The Frame Ground is a single hole bus bar mounting for NEMA 1-hole barrel lugs. Refer to Table C for power cable terminations. Refer to drawing 164201373–13 for the location of the power cable terminals inside the SSBM.
8. The system supports either a single common battery shared by all UPS modules or a separate battery for each UPS module. The system supports either valve regulated lead acid batteries or flooded (wet cell) batteries.
9. The rectifier inputs and bypass input three phase feeds should be symmetrical about ground, due to the existence of voltage surge protection devices.
10. The line-to-line unbalanced output capability of the UPS is limited only by the full load per phase current values for AC output to critical load. The recommended line-to-line load unbalance is 50% or less.
11. The SSBM can be equipped for separate input feeds for the SSBM Bypass input and the SMB Bypass input or for a single input feed for both the SSBM Bypass Input and the SMB Bypass Input.

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**Table C. Power Cable Termination Requirements
Powerware 9315 SSBM Model: 2500 and 3000**

<i>Terminal Function</i>	<i>Terminal</i>	<i>Function</i>	<i>Number of Cable Connections per Bus</i>	<i>Tightening Torque N-M (lb-ft)</i>	<i>Bolt/Int. Hex Size (In.)</i>
AC Input from UPS Output to SSBM	E8	Phase A	14 – 2 bolt mounting	76 (56)	1/2
	E9	Phase B	14 – 2 bolt mounting	76 (56)	1/2
	E10	Phase C	14 – 2 bolt mounting	76 (56)	1/2
	E4	Neutral	24 – 2 bolt mounting	76 (56)	1/2
	Frame Ground	Ground	24 – 1 bolt mounting	76 (56)	1/2
AC Input to SSBM Bypass	E1	Phase A	12 – 2 bolt mounting	76 (56)	1/2
	E2	Phase B	12 – 2 bolt mounting	76 (56)	1/2
	E3	Phase C	12 – 2 bolt mounting	76 (56)	1/2
	E4	*Neutral	24 – 2 bolt mounting	76 (56)	1/2
	Frame Ground	Ground	28 – 1 bolt mounting	76 (56)	1/2
AC Input to optional SMB Bypass (Separate Feed)	E11	Phase A	14 – 2 bolt mounting	76 (56)	1/2
	E12	Phase B	14 – 2 bolt mounting	76 (56)	1/2
	E13	Phase C	14 – 2 bolt mounting	76 (56)	1/2
	E4	*Neutral	24 – 2 bolt mounting	76 (56)	1/2
	Frame Ground	Ground	24 – 1 bolt mounting	76 (56)	1/2
AC Output from SSBM or Optional SMB to Critical Load	E5 (E15)	Phase A	12 (14) – 2 bolt mounting	76 (56)	1/2
	E6 (E16)	Phase B	12 (14) – 2 bolt mounting	76 (56)	1/2
	E7 (E17)	Phase C	12 (14) – 2 bolt mounting	76 (56)	1/2
	E4	*Neutral	24 (24) – 2 bolt mounting	76 (56)	1/2
	Frame Ground	Ground	20 (24) – 1 bolt mounting	76 (56)	1/2
AC Output from SSBM to Load Bank	Ø A	Phase A	12 – 2 bolt mounting	76 (56)	1/2
	Ø B	Phase B	12 – 2 bolt mounting	76 (56)	1/2
	Ø C	Phase C	12 – 2 bolt mounting	76 (56)	1/2
	E4	*Neutral	24 – 2 bolt mounting	76 (56)	1/2
	Frame Ground	Ground	28 – 1 bolt mounting	76 (56)	1/2

NOTES: * = These neutral bolt mountings are only available on SSBMs or SSBMs with SMBs rated as 3P/4W.

DESCRIPTION:

INSTALLATION NOTES

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**Table D. Power Cable Termination Requirements
Powerware 9315 SSBM Model: 4000**

<i>Terminal Function</i>	<i>Terminal</i>	<i>Function</i>	<i>Number of Cable Connections per Bus</i>	<i>Tightening Torque N-M (lb-ft)</i>	<i>Bolt/Int. Hex Size (In.)</i>
AC Input from UPS Output to SSBM	E8	Phase A	14 – 2 bolt mounting	76 (56)	1/2
	E9	Phase B	14 – 2 bolt mounting	76 (56)	1/2
	E10	Phase C	14 – 2 bolt mounting	76 (56)	1/2
	E4	Neutral	24 – 2 bolt mounting	76 (56)	1/2
	Frame Ground	Ground	30 – 1 bolt mounting	76 (56)	1/2
AC Input to SSBM Bypass	E1	Phase A	12 – 2 bolt mounting	76 (56)	1/2
	E2	Phase B	12 – 2 bolt mounting	76 (56)	1/2
	E3	Phase C	12 – 2 bolt mounting	76 (56)	1/2
	E4	*Neutral	24 – 2 bolt mounting	76 (56)	1/2
	Frame Ground	Ground	30 – 1 bolt mounting	76 (56)	1/2
AC Input to optional SMB Bypass (Separate Feed)	E11	Phase A	14 – 2 bolt mounting	76 (56)	1/2
	E12	Phase B	14 – 2 bolt mounting	76 (56)	1/2
	E13	Phase C	14 – 2 bolt mounting	76 (56)	1/2
	E4	*Neutral	24 – 2 bolt mounting	76 (56)	1/2
	Frame Ground	Ground	38 – 1 bolt mounting	76 (56)	1/2
AC Output from SSBM or Optional SMB to Critical Load	E5 (E15)	Phase A	12 (14) – 2 bolt mounting	76 (56)	1/2
	E6 (E16)	Phase B	12 (14) – 2 bolt mounting	76 (56)	1/2
	E7 (E17)	Phase C	12 (14) – 2 bolt mounting	76 (56)	1/2
	E4	*Neutral	24 (24) – 2 bolt mounting	76 (56)	1/2
	Frame Ground	Ground	30 (38) – 1 bolt mounting	76 (56)	1/2
AC Output from SSBM to Load Bank	Ø A	Phase A	12 – 2 bolt mounting	76 (56)	1/2
	Ø B	Phase B	12 – 2 bolt mounting	76 (56)	1/2
	Ø C	Phase C	12 – 2 bolt mounting	76 (56)	1/2
	E4	*Neutral	24 – 2 bolt mounting	76 (56)	1/2
	Frame Ground	Ground	30 – 1 bolt mounting	76 (56)	1/2

NOTES: * = These neutral bolt mountings are only available on SSBMs or SSBMs with SMBs rated as 3P/4W.

<i>DESCRIPTION:</i>		INSTALLATION NOTES
<i>DRAWING NO:</i>	164201373-1	<i>SHEET:</i> 4 of 6

12. The 100% rated bypass input overcurrent protection and bypass input disconnect switch are to be provided by the user. Table E lists the maximum rating for output circuit breakers satisfying the criteria for both. Rating is based on 100% of output current for a 100% breaker.

Table E. Maximum Bypass Input Circuit Breaker Ratings			
Powerware 9315 Switchboard System Bypass module	SSBM Model		
		2500	3000
SSBM Bypass	2500	3000	4000
SMB Bypass	2500	3000	4000

13. The breakers CBS, CBP, FBP, MBP (optional) and MIS (optional) have AT trip ratings and a maximum Amp Interrupting Capability (KAIC) as shown in Table F.

Table F. SSBM Breaker Trip Ratings and Amp Interrupting Capability				
Powerware 9315 Switchboard System Bypass module	SSBM Model			
	2500	3000	4000	All Models
	Trip Rating			KAIC
SSBM and SMB	N/A	3000	4000	65
	2500	3000	4000	100

14. The 100% rated output overcurrent protection and output disconnect switch are to be provided by the user. Table G lists the maximum rating for output circuit breakers satisfying the criteria for both. Rating is based on 100% of output current for a 100% breaker.

Table G. Maximum Output Circuit Breaker Ratings			
Powerware 9315 Switchboard System Bypass module	SSBM Model		
		2500	3000
SSBM	2500	3000	4000
SMB	2500	3000	4000

15. In the Parallel Capacity/Redundant System, each UPS module, Switchboard System Bypass Module (SSBM), SSBM breakers, and optional equipment are crated separately for shipping.
16. Do not tilt cabinets more than $\pm 10^\circ$ during handling.
17. Dimensions are in millimeters (inches).

DESCRIPTION:	INSTALLATION NOTES	
DRAWING NO:	164201373-1	SHEET: 5 of 6

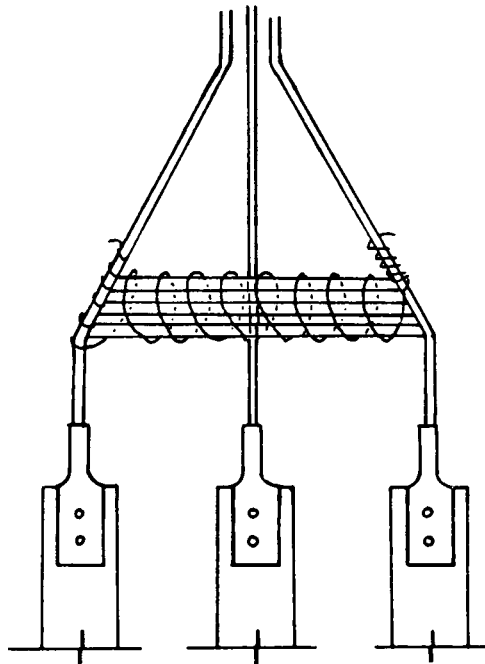
18. If perforated floor tiles are required for ventilation, you should place them in front of the UPS and Switchboard System Bypass Module (SSBM).
19. Ambient air convection cooling is the only cooling requirement for the SSBM. Recommended minimum clearance over the SSBM is 304.8 mm (12 in.). Do not block ventilation grills.
20. Your Switchboard System Bypass Module operating environment must meet the size and weight requirements shown in the enclosed switchboard vendor drawings.
21. The basic environmental requirements for operation of the UPS system are:

Ambient Temperature Range: 0–25°C (32–77°F)

Recommended Operating Range: 20–25°C (68–77°F)

Maximum Relative Humidity: 95% noncondensing

22. For SSBM and SMB rated for 100 kAIC, secure cables as shown in figure below to prevent cable whipping. Wrap line cable together with nominal 3/8 inch (9.5mm) nylon rope or other rope having a minimum tensile strength of 2000 pounds (8896 N). Wrap line cables at 6 inches (152mm) and 12 inches (305mm) from the line terminals with five wraps. Wrap each additional 6 inch (152.4mm) interval with five wraps or 1 inch (25.4mm) intervals with one wrap.



DESCRIPTION:

INSTALLATION NOTES

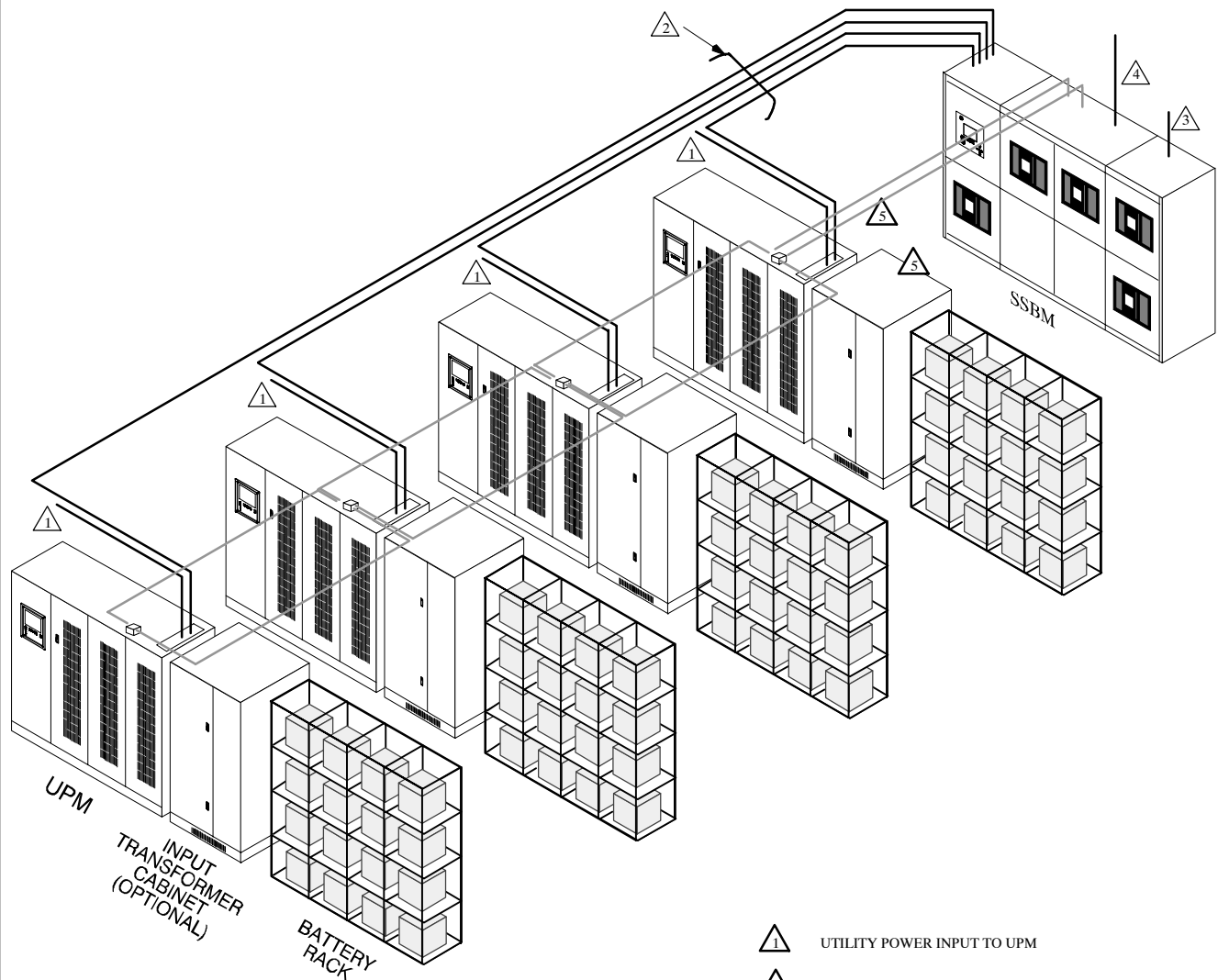
DRAWING NO:

164201373-1

SHEET:

6 of 6

SEPARATE BATTERY SYSTEM

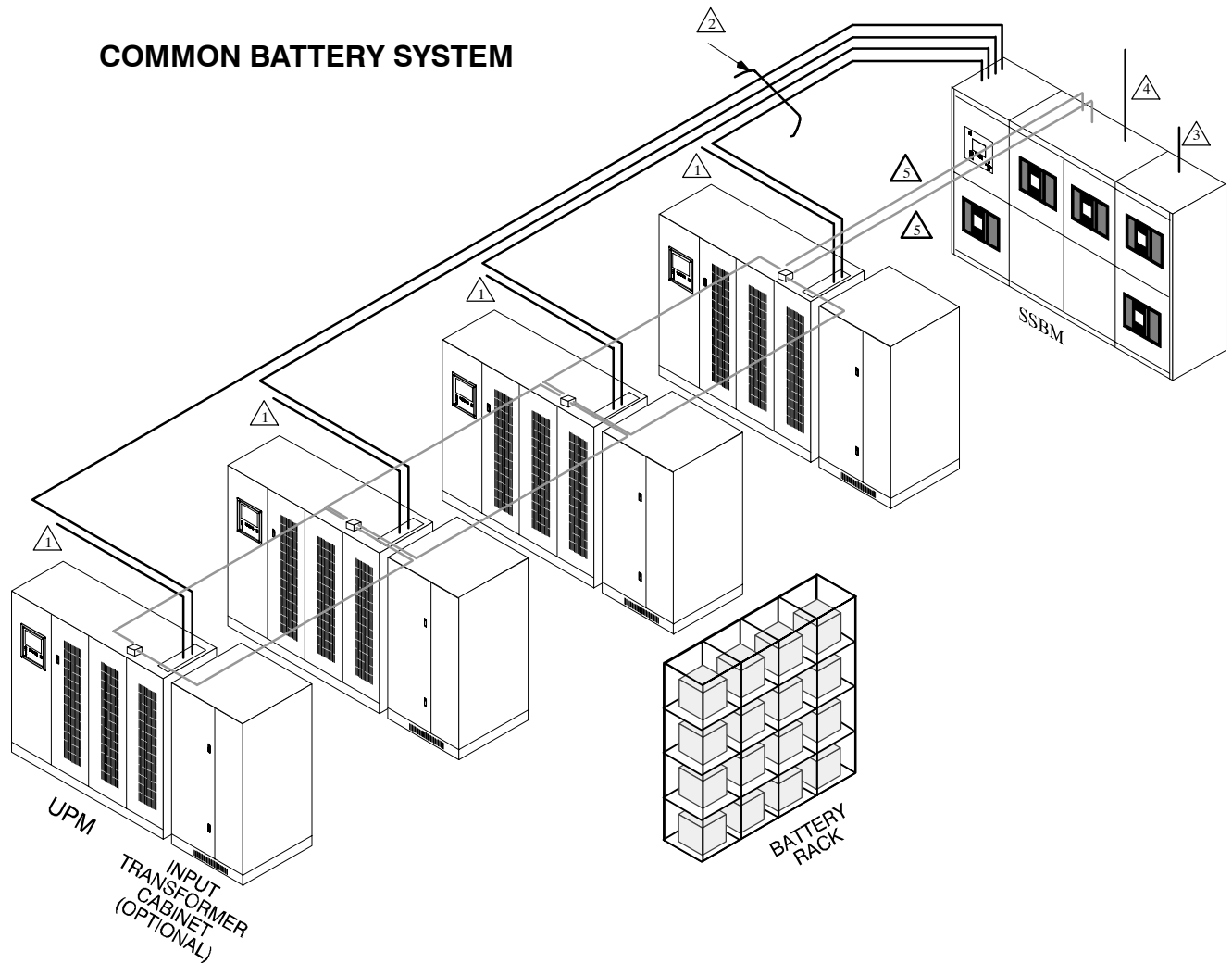


- NOTE:**
1. Accommodates one to eight UPMs. Four UPM system shown.
 2. The input transformer cabinet may be installed on either the left or the right side of the UPM cabinet.
 3. Refer to the **Powerware® 9315 UPS Installation** manual provided with the UPMs, for UPM, battery, and optional input transformer installation information.
 4. Actual SSBM physical arrangement and cable connection locations may differ from that shown. See drawings 164201373-11 and 164201373-12 for details.






- 1 UTILITY POWER INPUT TO UPM
- 2 UPM OUTPUT TO SSBM INPUT
**See Table O of Appendix A for UPM Output Conductor Sizing.*
- 3 SSBM OUTPUT TO CRITICAL LOAD
- 4 UTILITY POWER INPUT TO BYPASS BUS
- 5 POWERNET DUAL REDUNDANT NETWORK
SSBM INTERFACE - TERMINAL BLOCK TB1
UPM INTERFACE - TERMINAL BLOCK TB1
*FOR 9315-625/750 UPM ONLY:
ALSO INCLUDES DUAL REDUNDANT NETWORK POWER SUPPLY
SBM INTERFACE - TB7
UPM INTERFACE - CANA & CANB*

DESCRIPTION:	TYPICAL PARALLEL CAPACITY/ REDUNDANT SYSTEM WITH SSBM	
DRAWING NO:	164201373-2	SHEET: 1 of 2

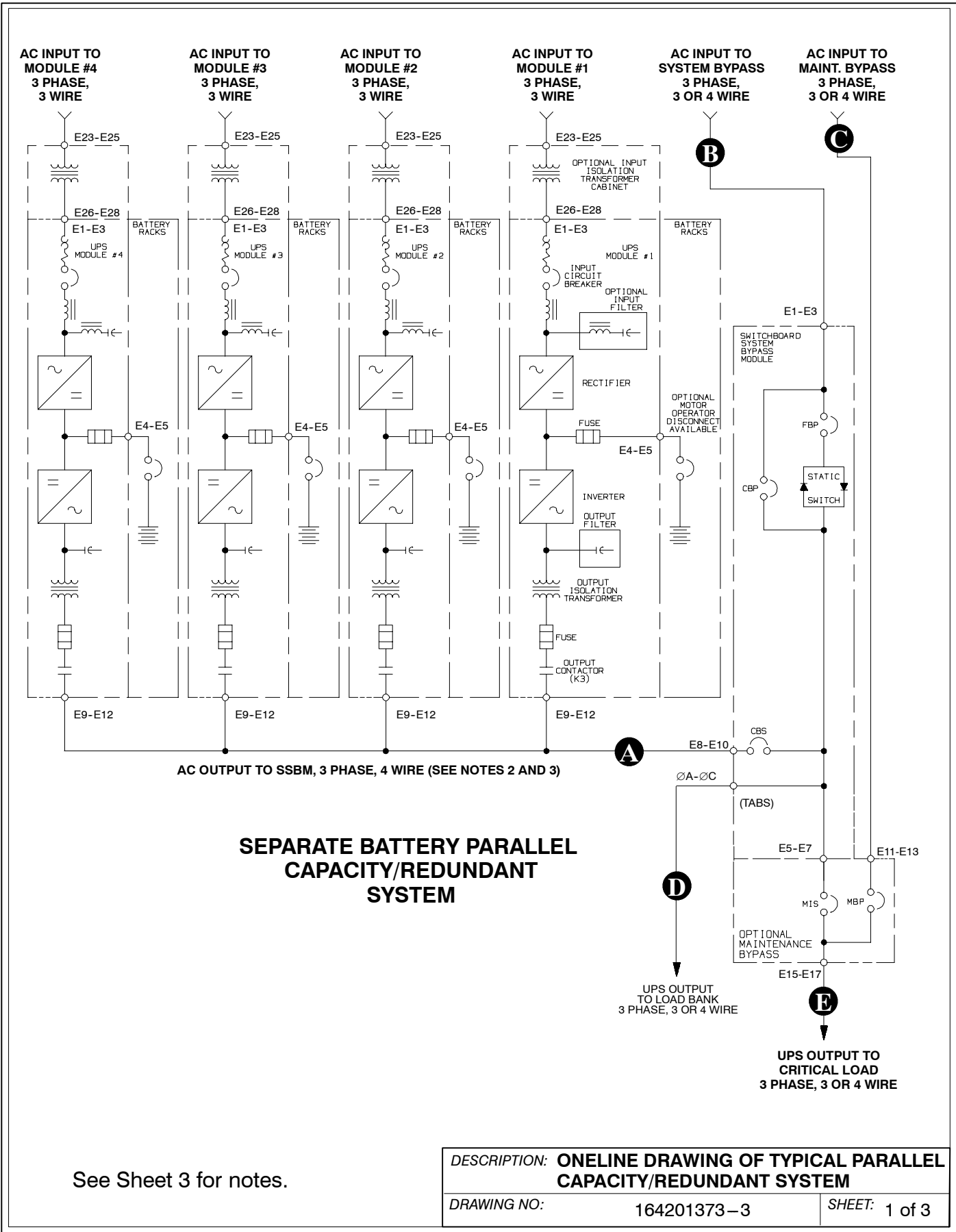
COMMON BATTERY SYSTEM



- NOTE:**
1. Accommodates one to eight UPMs. Four UPM system shown.
 2. The input transformer cabinet may be installed on either the left or the right side of the UPM cabinet.
 3. Refer to the **Powerware® 9315 UPS Installation** manual provided with the UPMs, for UPM, battery, and optional input transformer installation information.
 4. Actual SSBM physical arrangement and cable connection locations may differ from that shown. See drawings 164201373-11 and 164201373-12 for details.

-  UTILITY POWER INPUT TO UPM
-  UPM OUTPUT TO SSBM INPUT
**See Table O of Appendix A for UPM Output Conductor Sizing.*
-  SSBM OUTPUT TO CRITICAL LOAD
-  UTILITY POWER INPUT TO BYPASS BUS
-  POWERNET DUAL REDUNDANT NETWORK
SSBM INTERFACE - TERMINAL BLOCK TB1
UPM INTERFACE - TERMINAL BLOCK TB1
*FOR 9315-625/750 UPM ONLY:
ALSO INCLUDES DUAL REDUNDANT NETWORK POWER SUPPLY
SBM INTERFACE - TB7
UPM INTERFACE - CANA & CANB*

DESCRIPTION:	TYPICAL PARALLEL CAPACITY/ REDUNDANT SYSTEM WITH SSBM	
DRAWING NO:	164201373-2	SHEET: 2 of 2



See Sheet 3 for notes.

AC INPUT TO
MODULE #4
3 PHASE,
3 WIRE

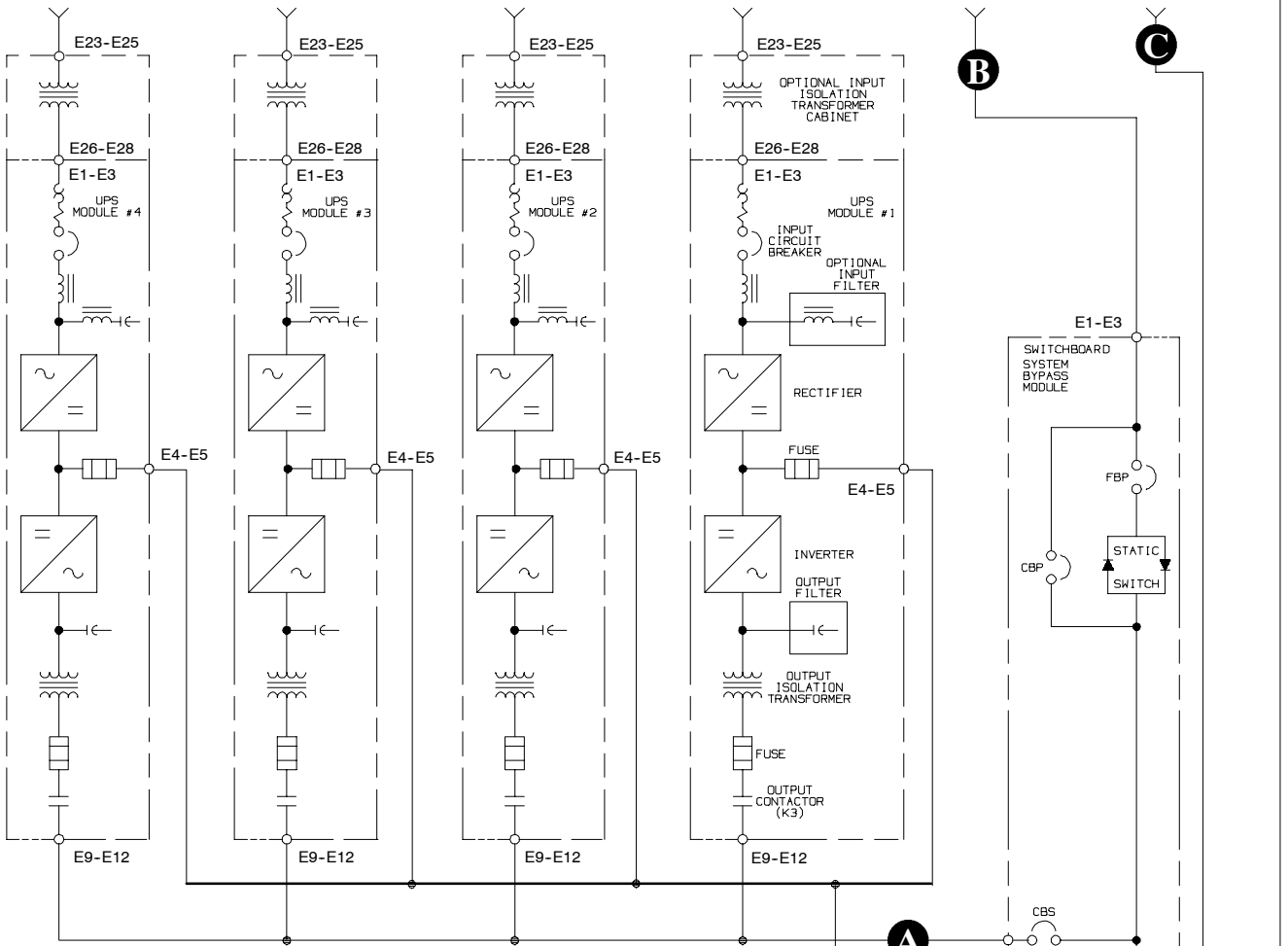
AC INPUT TO
MODULE #3
3 PHASE,
3 WIRE

AC INPUT TO
MODULE #2
3 PHASE,
3 WIRE

AC INPUT TO
MODULE #1
3 PHASE,
3 WIRE

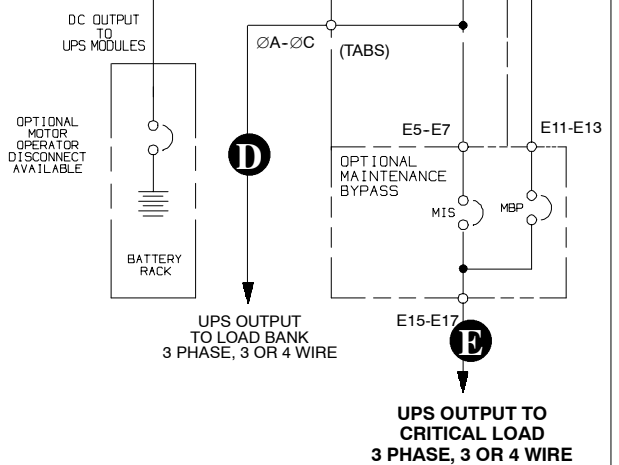
AC INPUT TO
SYSTEM BYPASS
3 PHASE,
3 OR 4 WIRE

AC INPUT TO
MAINT. BYPASS
3 PHASE,
3 OR 4 WIRE



AC OUTPUT TO SSBM, 3 PHASE, 4 WIRE (SEE NOTES 2 AND 3)

**COMMON BATTERY PARALLEL
CAPACITY/REDUNDANT
SYSTEM**



UPS OUTPUT
TO LOAD BANK
3 PHASE, 3 OR 4 WIRE

UPS OUTPUT TO
CRITICAL LOAD
3 PHASE, 3 OR 4 WIRE

See Sheet 3 for notes.

DESCRIPTION: ONLINE DRAWING OF TYPICAL PARALLEL CAPACITY/REDUNDANT SYSTEM		
DRAWING NO:	164201373-3	SHEET: 2 of 3

NOTE: 1. Accommodates one to eight UPMs. Four UPM system shown.

NOTE: 2. A bypass neutral feeder must be installed when the output neutral is used. If no bypass neutral is installed, the output neutral is to be bonded to the chassis in the SSBM through the minimum size copper conductor listed in Table H. In either case, fully rated neutral conductors are to be run from the output of each UPM to the neutral bus bar inside the SSBM.

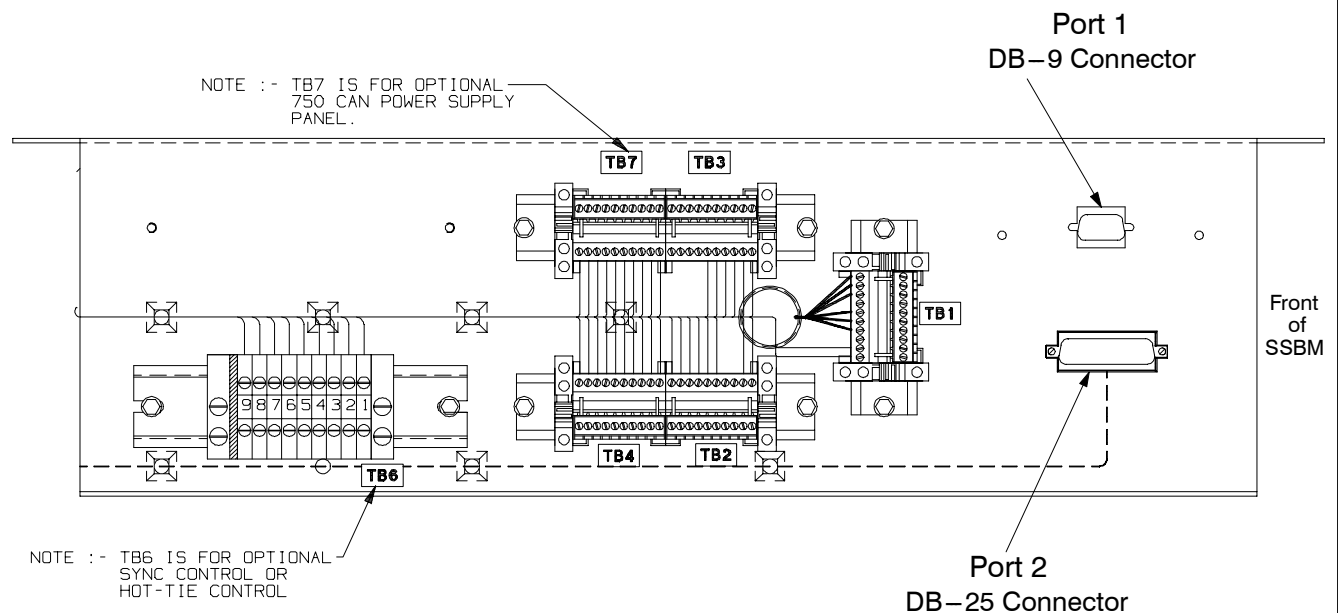
Table H. Minimum Size Copper Bonding Jumper	
SSBM Model	Wire Size (kcmil)
2500A	500
3000A	600
4000A	700

NOTE: 3. Refer to Section 1.1.4 for additional guidance for wiring and conduit installation.

NOTE: 4. The required neutral conductors must be spread as evenly as possible through the available runbacks.

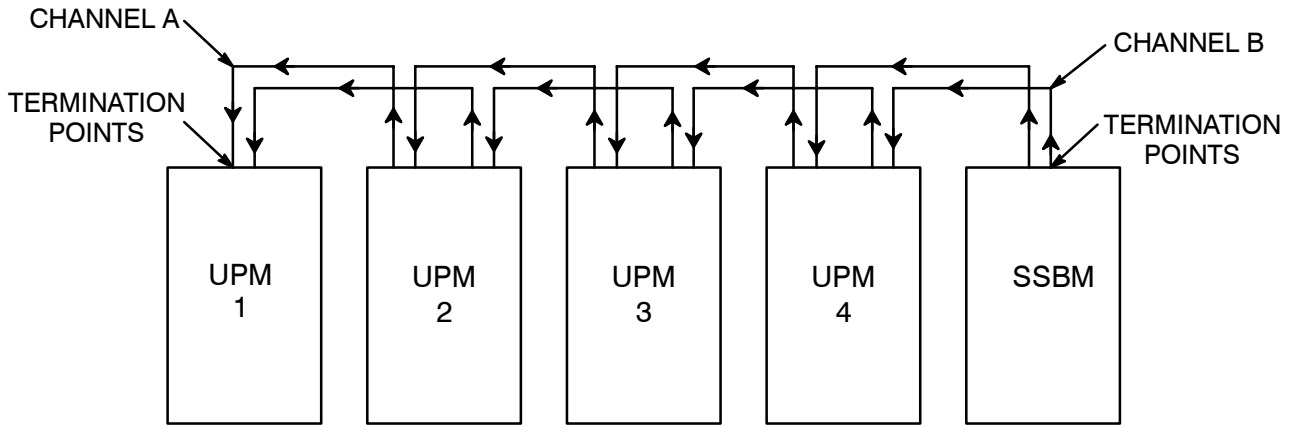
DESCRIPTION: ONELINE DRAWINGS OF TYPICAL PARALLEL CAPACITY/REDUNDANT SYSTEM	
DRAWING NO: 164201373-3	SHEET: 3 of 3

1. Two redundant PowerNet control networks connect UPM module to UPM module and UPM module to the SSBM. Each network requires only one shielded twisted pair of wires.
2. Refer to drawing 164201373–13 for location of the Customer Interface panel (A1).
3. Use Class 1 wiring methods (as defined by the NEC) for control wiring. Install the control wiring in separate conduits from the power wiring. Install the twisted pair of each redundant PowerNet network in separate conduits. The wire should be rated at 24 volts, 1 amp minimum. The recommended wire for the PowerNet network is shielded 20 gauge twisted pair Belden 8762 (Powerware Part Number 175090703) or equivalent. The recommended wire for the optional Network Power Supply panel (A13) for Powerware 9315–625/750 UPMs is 14 gauge twisted pair.
4. Control wiring run may not exceed 100 meters.
5. Refer to sheet 2 for typical control wiring routing. Use Arrangement C for a more robust network.
6. Connect control wiring and terminating resistor (if applicable) to the removable portion of the terminal block.
7. Terminate each redundant PowerNet network at the end modules in the system. Use a 120 ohm, 1/4 watt, 5% resistor (Powerware Part Number 141202041). Refer to sheet 2 for typical termination points.
8. If SSBM is to be terminated, install terminating resistors onto terminal block TB1. Refer to sheet 3 for terminal location. Connect each resistor across terminals 1 and 2 and 6 and 7.
9. Refer to Tables I, J, and K, and to applicable chapters for information about installing control wiring.

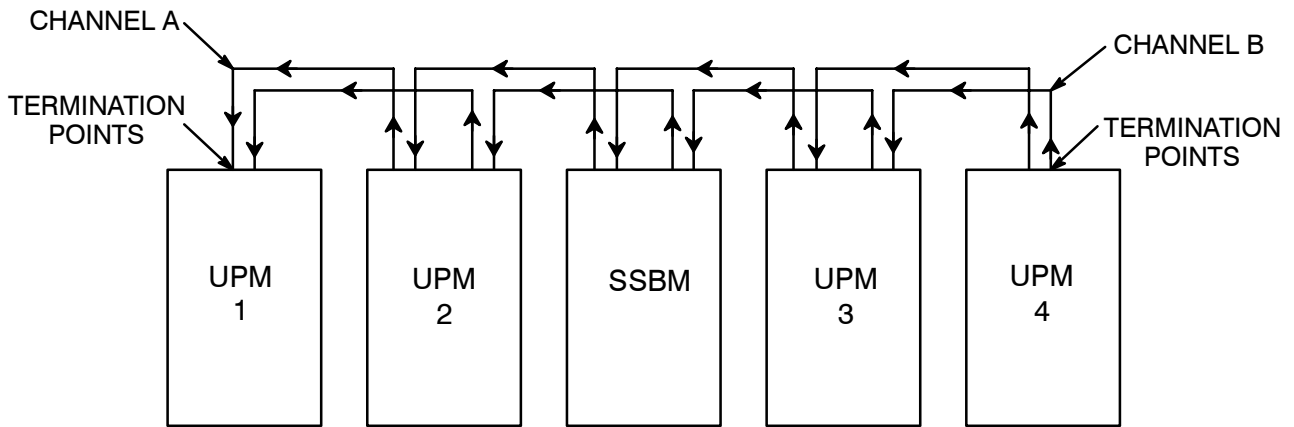


**SSBM
Customer Interface Panel
Top View**

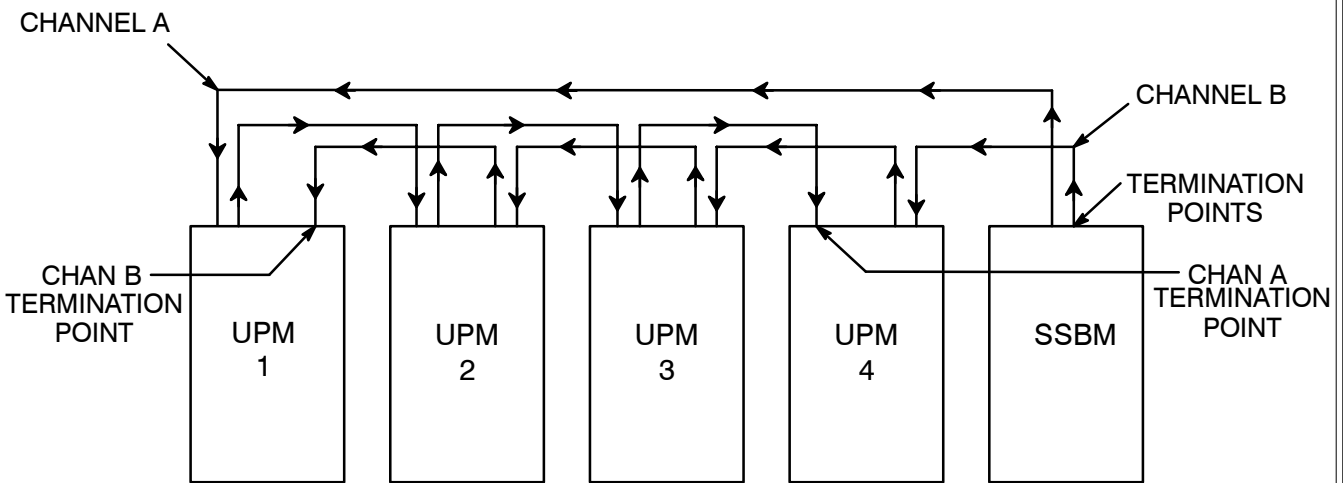
<i>DESCRIPTION:</i>	
SSBM CUSTOMER INTERFACE PANEL	
<i>DRAWING NO:</i>	164201373–4
<i>SHEET:</i>	1 of 6



Arrangement A



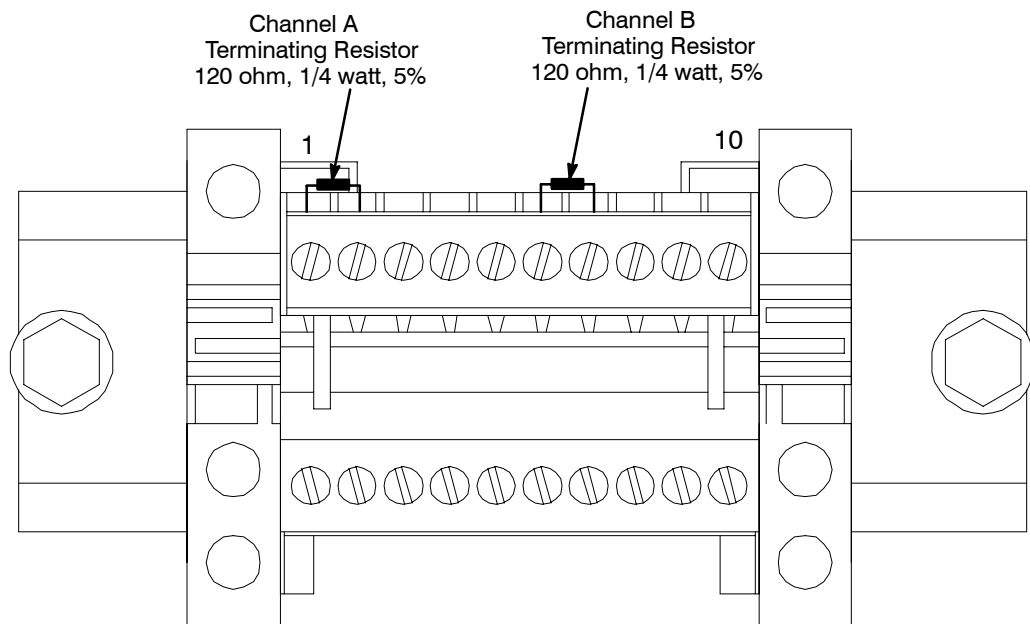
Arrangement B



Arrangement C (Robust Network Routing)

**SSBM
TYPICAL POWERNET NETWORK
WIRING AND TERMINATIONS**

<i>DESCRIPTION:</i>	
SSBM CUSTOMER INTERFACE PANEL	
<i>DRAWING NO:</i>	164201373-4
<i>SHEET:</i>	2 of 6



**SSBM and UPM PowerNet Interface Terminal Block
Terminating Resistor Location**

<i>DESCRIPTION:</i>		
SSBM CUSTOMER INTERFACE PANEL		
<i>DRAWING NO:</i>	164201373-4	<i>SHEET:</i> 3 of 6

Table I. Control Wiring Terminations		
Terminal	Description	Terminal Function
TB1	Compression Terminal Block with removable customer wiring plug	Channel A PowerNet
		Channel B PowerNet
		EPO to UPS Module
TB2	Compression Terminal Block with removable customer wiring plug	Remote EPO
		Building Alarms 1 through 3
TB3	Compression Terminal Block with removable customer wiring plug	Building Alarms 4 through 6
TB4	Compression Terminal Block with removable customer wiring plug	On UPS Monitoring
		On Bypass Monitoring
		Summary Alarm & Notice Contact
TB6	Compression Terminal Block	Sync Reference Voltage for Optional Sync Control, Hot-Tie Control or Hot-Tie with Sync Control
TB7	Compression Terminal Block with removable customer wiring plug	Optional CAN Power Supply Panel (A13) Terminal Block for Powerware 9315 (500 kVA–750 kVA) Models only

DESCRIPTION:

SSBM CUSTOMER INTERFACE PANEL

DRAWING NO:

164201373-4

SHEET:

4 of 6

Table J. Customer Interface Panel Inputs and Outputs

Terminal Block	TB Pin #	Name	Description
TB1	1	CHANNEL A POWERNET – HIGH	Channel A connection of PowerNet from UPS Modules. Used to control and monitor UPS modules.
	2	CHANNEL A POWERNET – LOW	
	3	CHANNEL A POWERNET – GND	
	4	NOT USED	
	5	NOT USED	
	6	CHANNEL B POWERNET – HIGH	Channel B connection of PowerNet from UPS Modules. Used to control and monitor UPS modules.
	7	CHANNEL B POWERNET – LOW	
	8	CHANNEL B POWERNET – GND	
	9	EPO TO UPS MODULE – RTN	Emergency Power Off control connections for UPS modules
	10	EPO TO UPS MODULE	
TB2	1	REMOTE EPO	Contacts used to activate remote EPO of SSBM and UPS.
	2	REMOTE EPO RTN	
	3	NOT USED	
	4	NOT USED	
	5	BLDG ALARM 1	Programmable UPS alarm. Activated by a remote contact closure. (See Note 1)
	6	BLDG ALARM 1 RTN	
	7	BLDG ALARM 2	Programmable UPS alarm. Activated by a remote contact closure. (See Note 1).
	8	BLDG ALARM 2 RTN	
	9	BLDG ALARM 3	Programmable UPS alarm. Activated by a remote contact closure.
	10	BLDG ALARM 3 RTN	
TB3	1	BLDG ALARM 4	Programmable UPS alarm. Activated by a remote contact closure. Default is Go to Bypass. (See Note 2 and 3)
	2	BLDG ALARM 4 RTN	
	3	BLDG ALARM 5	Programmable UPS alarm. Activated by a remote contact closure. Default is Go to UPS. (See Note 4)
	4	BLDG ALARM 5 RTN	
	5	BLDG ALARM 6	Programmable UPS alarm. Activated by a remote contact closure. Default is on Generator.
	6	BLDG ALARM 6 RTN	
	7	NOT USED	
	8	NOT USED	
	9	NOT USED	
	10	NOT USED	

NOTES:

1. If the SSBM is equipped with an optional System Maintenance Bypass (SMB), Building Alarms #1 and #2 are used for the MIS and MBP breakers shown on the Monitor Panel Mimic and are unavailable for customer use.
2. If the SSBM is setup for Powerware Sync Control, Building Alarm #4 is used for the “Sync Control Trouble” alarm and is unavailable for customer use.
3. If the SSBM is setup for Powerware Hot-Tie Control, Building Alarm #4 is used for the programmed control function “Hot-Tie Trouble” and is unavailable for customer use.
4. If the SSBM is setup for Powerware Sync Control or Hot-Tie Control, Building Alarm #5 is used for the programmed control function “Transfer to Bypass Disabled” and is unavailable for customer use.

<i>DESCRIPTION:</i>		SSBM CUSTOMER INTERFACE PANEL
<i>DRAWING NO:</i>	164201373-4	<i>SHEET:</i> 5 of 6

Table J. Customer Interface Panel Inputs and Outputs (Cont'd)

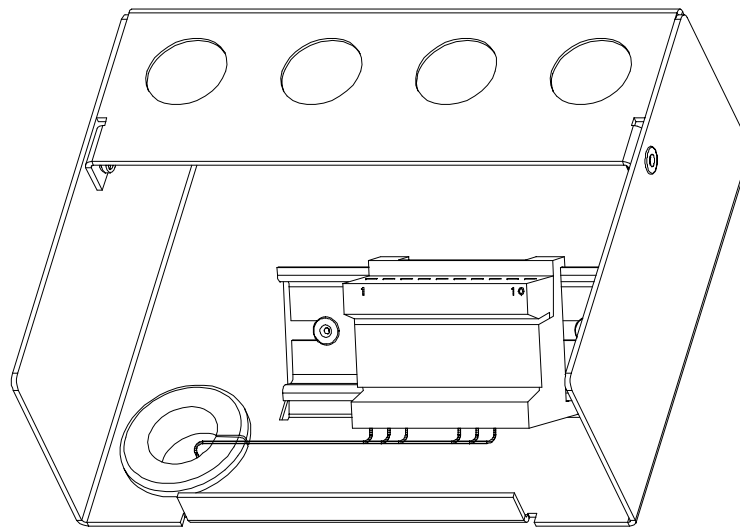
Terminal Block	TB Pin #	Name	Description
TB4	1	ON UPS	Contacts used to indicate On UPS status of Parallel Capacity/Redundant System
	2	ON UPS RTN	
	3	ON BYPASS	Contacts used to indicate On Bypass status of Parallel Capacity/Redundant System (See Note 6)
	4	ON BYPASS RTN	
	5	RELAY # 1 NC	General purpose NO and NC relay contacts. (See Note 4)
	6	RELAY # 1 NO	
	7	RELAY # 1 RTN	
	8	RELAY # 2 NC	General purpose NO and NC relay contacts. (See Note 5)
	9	RELAY # 2 NO	
	10	RELAY # 2 RTN	
TB6	1	Bypass \emptyset A	Sync Reference Voltage for Optional Powerware 9315 Sync Control Connections. Also used for Optional Powerware Hot-Tie Control and Hot-Tie with Sync Control connections.
	2	Bypass \emptyset B	
	3	Bypass \emptyset C	
	4	Sync Reference \emptyset A	
	5	Sync Reference \emptyset B	
	6	Sync Reference \emptyset C	
	7	Output \emptyset A	
	8	Output \emptyset B	
	9	Output \emptyset C	
TB7	1	+12VDC	Optional CAN Power Supply Panel (A13) Terminal Block for Powerware 9315 (500 kVA – 750 kVA) Models only
	2	+12VDC RTN	
	3	+12VDC	
	4	+12VDC RTN	
	5	+12VDC	
	6	+12VDC RTN	
	7	+12VDC	
	8	+12VDC RTN	
	9	+12VDC	
	10	+12VDC RTN	

NOTES:

- 5. Relay 1 is normally deenergized and is only energized for an alarm condition.
- 6. Relay 2 is normally energized and is only deenergized for an alarm condition.
- 7. If the SSBM is setup for a Powerware Sync Control, the ON BYPASS contact is used for Sync Control and is not available for customer use.

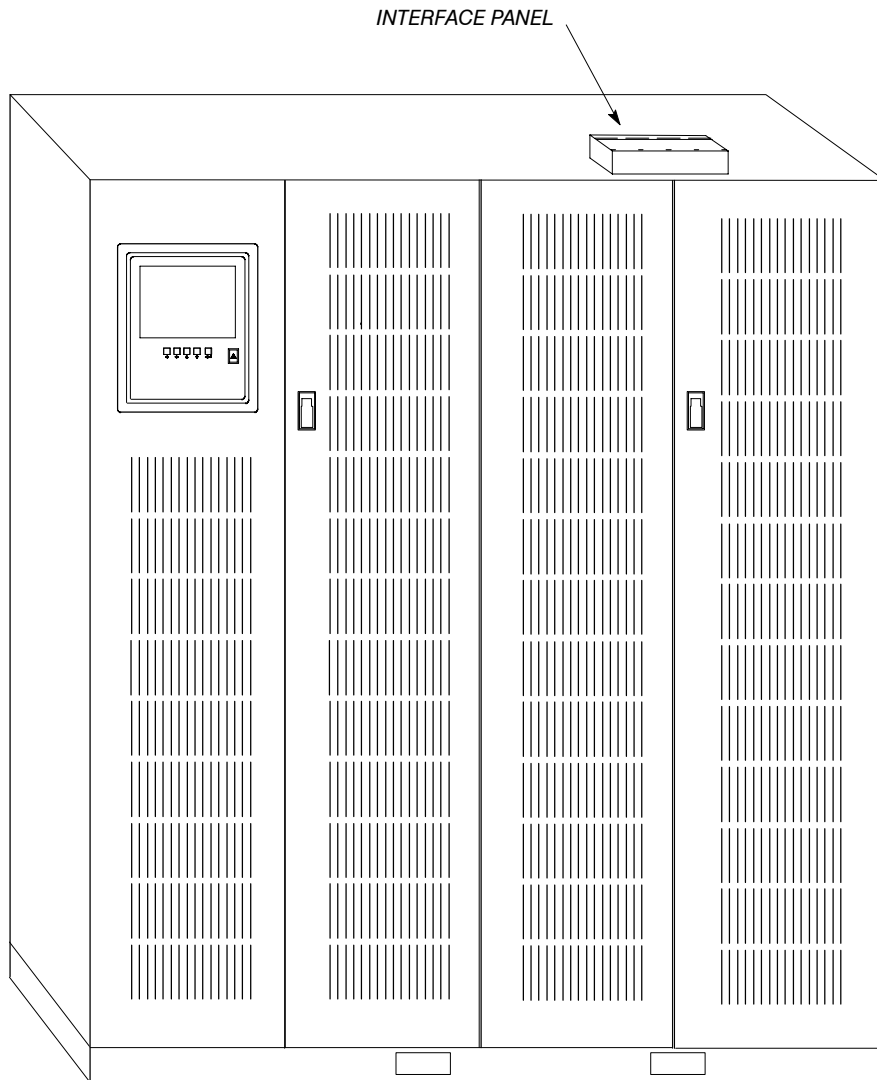
<i>DESCRIPTION:</i>	
SSBM CUSTOMER INTERFACE PANEL	
<i>DRAWING NO:</i>	164201373-4
<i>SHEET:</i>	6 of 6

1. Two redundant PowerNet control networks connect the UPMs to each other and the UPMs to the SSBM. Each network requires only one shielded twisted pair of wires.
2. Refer to sheets 2 and 3 for location of the UPM PowerNet Interface Panel.
3. Use Class 1 wiring methods (as defined by the NEC) for control wiring. Install the control wiring in separate conduits from the power wiring. Install the twisted pair of each redundant PowerNet network in separate conduits. The wire should be rated at 24 volts, 1 amp minimum. The recommended wire for the PowerNet network is shielded 22 gauge twisted pair Belden 8761 or equivalent.
4. Control wiring run may not exceed 100 meters.
5. Connect control wiring and terminating resistor (if applicable) to the removable portion of the terminal block.
6. Terminate each redundant PowerNet network at the end modules in the system. Use a 120 ohm, 1/4 watt, 5% resistor (Powerware Part Number 141202041). Refer to drawing 164201373-4, sheet 2 for typical termination points.
7. Install terminating resistors onto appropriate UPM PowerNet Interface Panel terminal block. Refer to drawing 164201373-4, sheet 3 for terminal location. Connect each resistor across terminals 1 and 2 and 6 and 7.
8. Refer to Tables K and L, and to applicable chapters for information about installing control wiring.



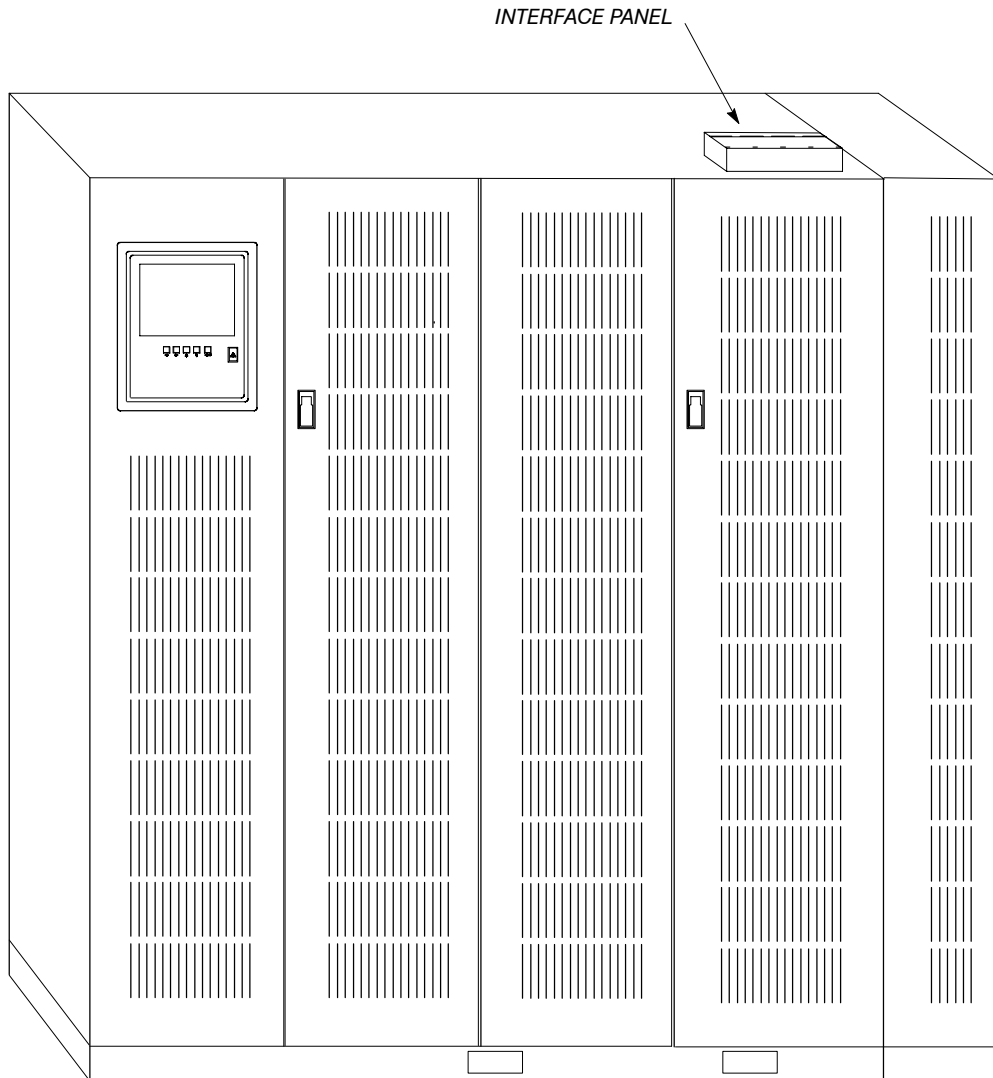
UPM PowerNet Interface Panel

DESCRIPTION: UPM POWERNET INTERFACE PANEL:		
POWERWARE 9315-200 TO -500 UPMs		
DRAWING NO:	164201373-5	SHEET: 1 of 4



Powerware 9315 (200 kVA–300 kVA) PowerNet Interface Panel Location

DESCRIPTION: UPM POWERNET INTERFACE PANEL: POWERWARE 9315–200 TO –500 UPMs	
DRAWING NO: 164201373–5	SHEET: 2 of 4



Powerware 9315 (400 kVA–500 kVA) PowerNet Interface Panel Location

DESCRIPTION: UPM POWERNET INTERFACE PANEL:	
POWERWARE 9315–200 TO –500 UPMs	
DRAWING NO: 164201373–5	SHEET: 3 of 4

Table K. Control Wiring Terminations

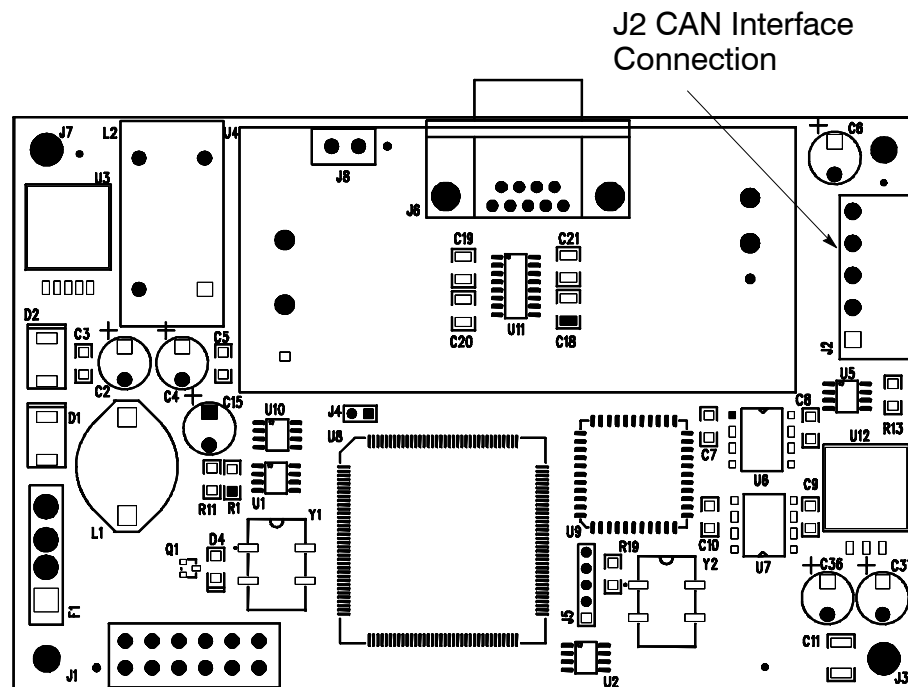
Terminal	Description	Terminal Function
PowerNet Terminal Block	Compression Terminal Block with removable customer wiring plug	Channel A PowerNet
		Channel B PowerNet
		EPO to UPM (Optional)

Table L. UPM Powernet Interface Panel Inputs and Outputs

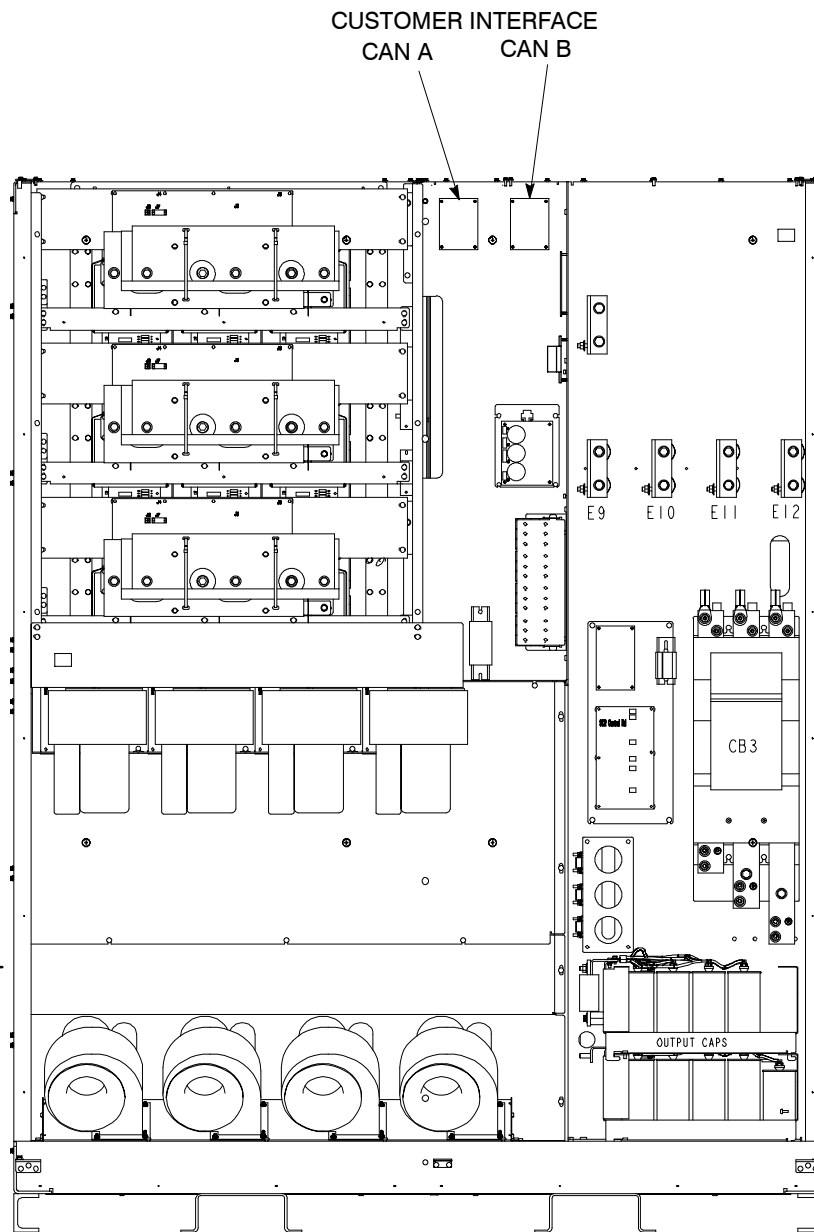
Terminal Block	TB Pin #	Name	Description
PowerNet	1	CHANNEL A POWERNET – HIGH	Channel A connection of PowerNet from SSBM. Used to control and monitor UPMs.
	2	CHANNEL A POWERNET – LOW	
	3	CHANNEL A POWERNET – GND	
	4	NOT USED	
	5	NOT USED	
	6	CHANNEL B POWERNET – HIGH	Channel B connection of PowerNet from SSBM. Used to control and monitor UPMs.
	7	CHANNEL B POWERNET – LOW	
	8	CHANNEL B POWERNET – GND	
	9	EPO TO UPS MODULE – RTN	Emergency Power Off control connections for UPMs. (Optional)
	10	EPO TO UPS MODULE	

DESCRIPTION: UPM POWERNET INTERFACE PANEL	
POWERWARE 9315-200 TO -500 UPMs	
DRAWING NO: 164201373-5	SHEET: 4 of 4

1. Two redundant PowerNet control networks connect the UPMs to each other and the UPMs to the SSBM. Each network requires only one shielded twisted pair of wires and one twisted pair of wires for the redundant power supplies. The control wiring is connected at J2 of the CAN interface. See drawing below.
2. Refer to sheets 2 and 3 for location of the CAN A and CAN B Logic Boards.
3. Use Class 1 wiring methods (as defined by the NEC) for control wiring. Install the control wiring in separate conduits from the power wiring. Install the twisted pair of each redundant PowerNet network in separate conduits. The wire should be rated at 24 volts, 1 amp minimum. The recommended wire for the PowerNet network is shielded 20 gauge twisted pair Belden 8762 or equivalent. The recommended wire for the power supplies is 14 gauge twisted pair
4. Control wiring run may not exceed 100 meters.
5. Connect control wiring to the removable portion of the terminal block.
6. Terminate each redundant PowerNet network at the end modules in the system. Refer to drawing 164201373-4, sheet 2 for typical termination points.
7. Refer to applicable chapters for information about installing control wiring.



DESCRIPTION:	UPM CAN INTERFACE: POWERWARE 9315-625/750 UPMs	
DRAWING NO:	164201373-6	SHEET: 1 of 3



Powerware 9315 750 CAN A and CAN B Interface Location

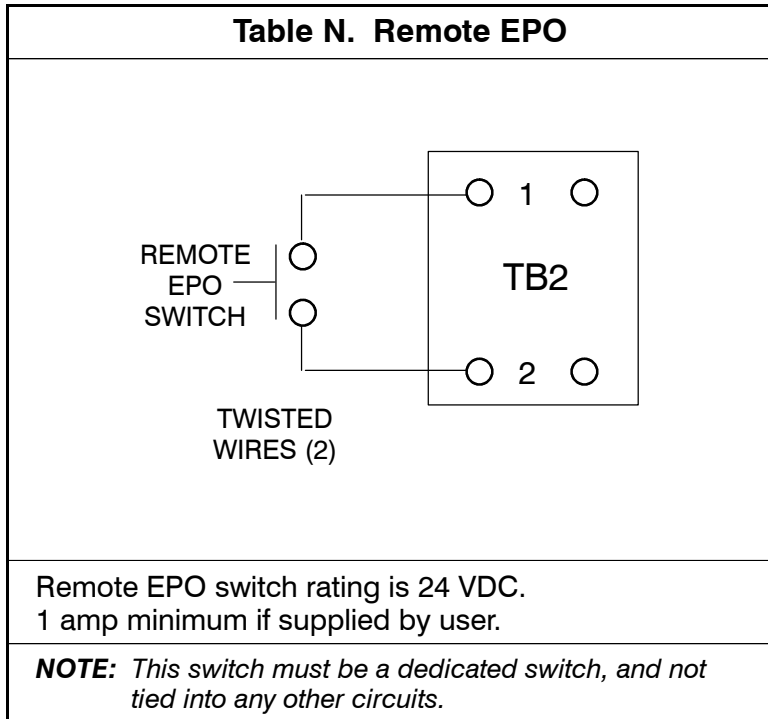
DESCRIPTION:	UPM CAN INTERFACE: POWERWARE 9315-625/750 UPMs	
DRAWING NO:	164201373-6	SHEET: 2 of 3

Table M. UPM CAN A & CAN B Interface Inputs and Outputs

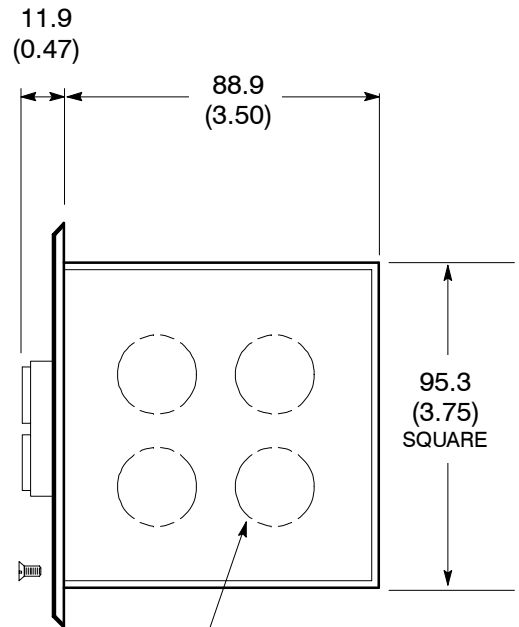
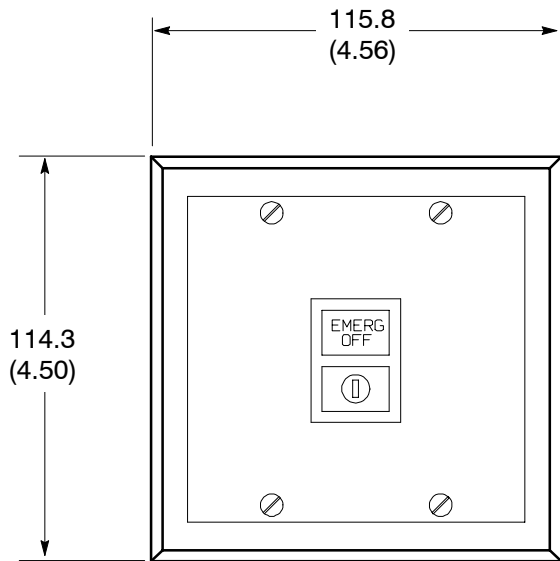
From SSBM	To UPM	Name	Description
A1TB1-1	CAN A J2-3	CHANNEL A POWERNET – HIGH	Channel A connection of PowerNet from SSBM. Used to control and monitor UPMs.
A1TB1-2	CAN A J2-4	CHANNEL A POWERNET – LOW	
A1TB1-3	CAN A J2-5	CHANNEL A POWERNET – GND	
A1TB7-1	CAN A J2-1	CONTROL POWER – 12VDC	Control power connection for Channel A CAN Logic Board from SSBM.
A1TB7-2	CAN A J2-2	CONTROL POWER – GND	
A1TB1-6	CAN B J2-3	CHANNEL B POWERNET – HIGH	Channel B connection of PowerNet from SSBM. Used to control and monitor UPMs.
A1TB1-7	CAN B J2-4	CHANNEL B POWERNET – LOW	
A1TB1-8	CAN B J2-5	CHANNEL B POWERNET – GND	
A1TB7-3	CAN B J2-1	CONTROL POWER – 12VDC	Control power connection for Channel B CAN Logic Board from SSBM.
A1TB7-4	CAN B J2-2	CONTROL POWER – GND	

<i>DESCRIPTION:</i>	UPM CAN INTERFACE: POWERWARE 9315-625/750 UPMs	
<i>DRAWING NO:</i>	164201373-6	<i>SHEET:</i> 3 of 3

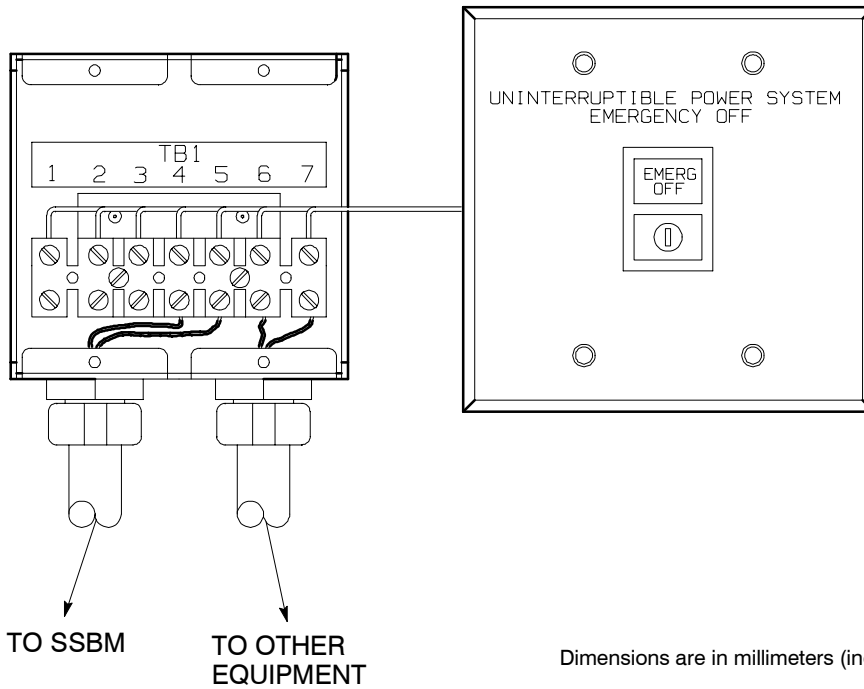
1. The Remote EPO feature shuts down the UPS modules, opens all breakers in the Switchboard System Bypass Module and isolates power from your critical load. Local electrical codes may also require tripping upstream protective devices to the UPS modules.
2. To open all UPM breakers, a separate twisted pair of wires and an EPO Kit (sold separately) must be installed to the modules from the SSBM.
3. Use Class 1 wiring methods (as defined by the NEC) for control wiring. Install the control wiring in separate conduit from the power wiring. The wire should be rated at 24 volts, 1 amp minimum.
4. Refer to Table N of this drawing and to applicable chapters for information about installing control remote EPO.
5. Refer to drawings 164201373–4 and 164201373–13 for location of the Customer Interface panel and drawing 164201373–4 for the terminal block location on the Customer Interface Panel.



<i>DESCRIPTION:</i>	REMOTE EMERGENCY POWER OFF	
<i>DRAWING NO:</i>	164201373–7	<i>SHEET:</i> 1 of 2

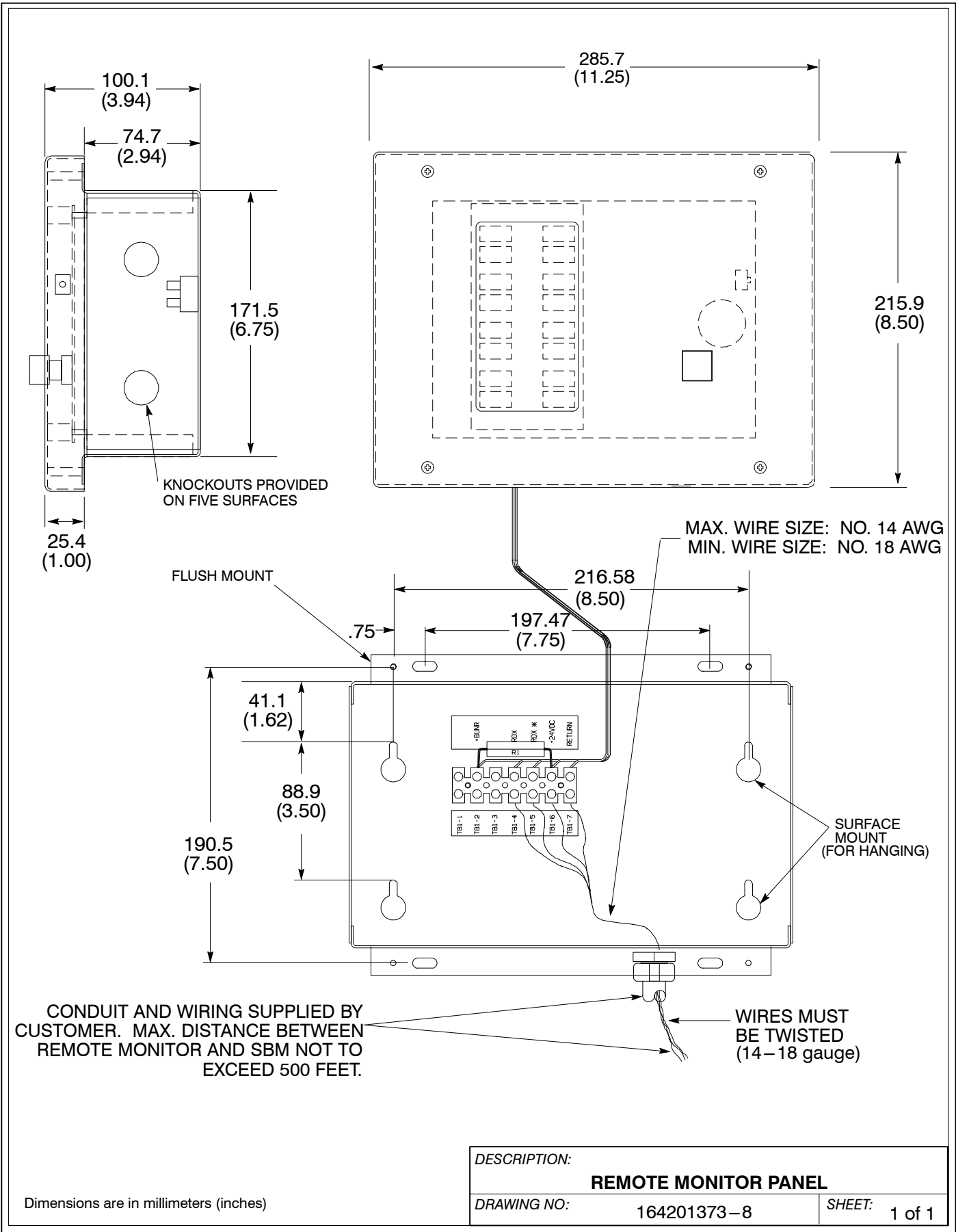


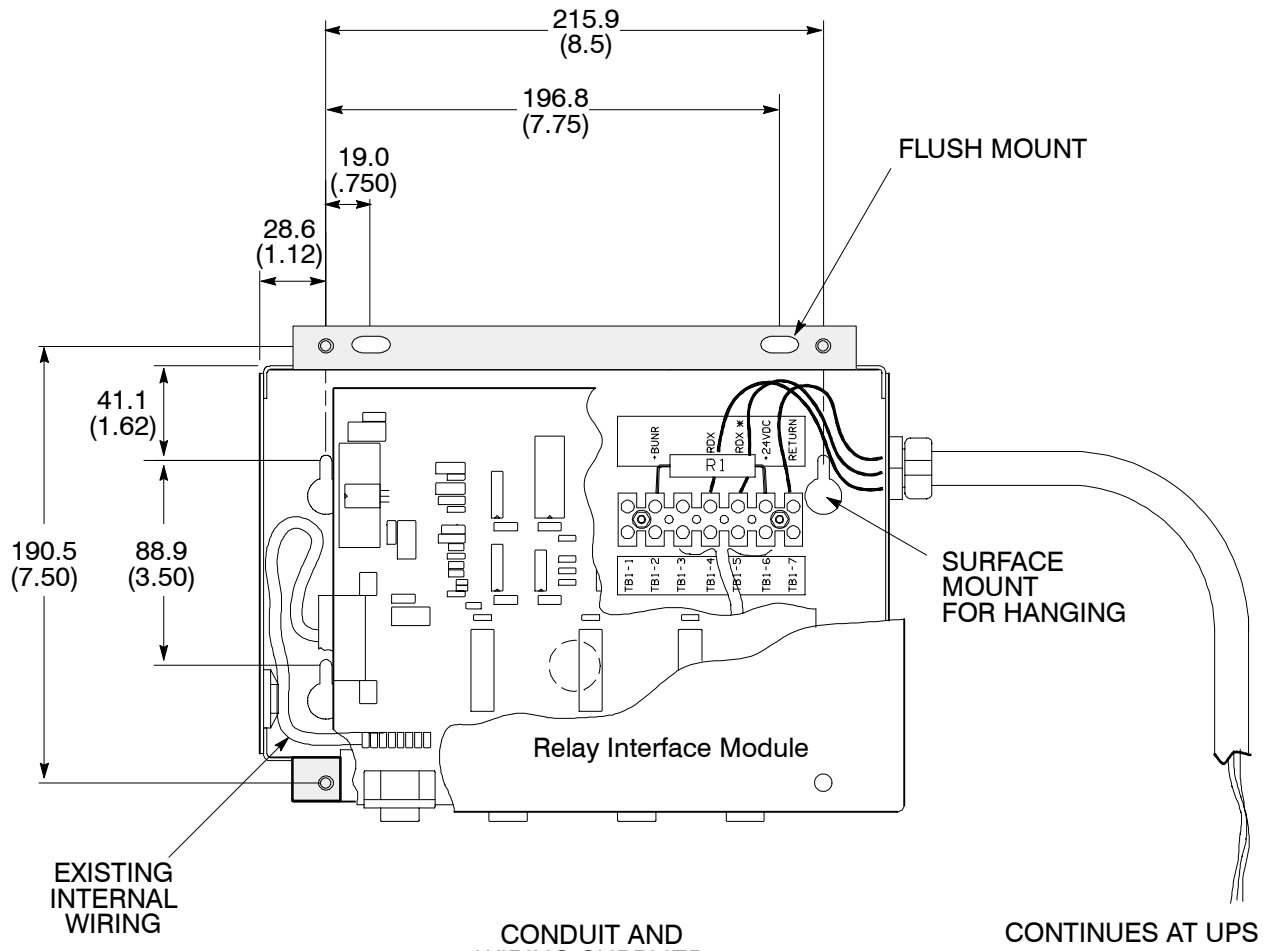
Knockout pattern
typ. 5 sides



Dimensions are in millimeters (inches)

DESCRIPTION:	REMOTE EMERGENCY POWER OFF	
DRAWING NO:	164201373-7	SHEET: 2 of 2

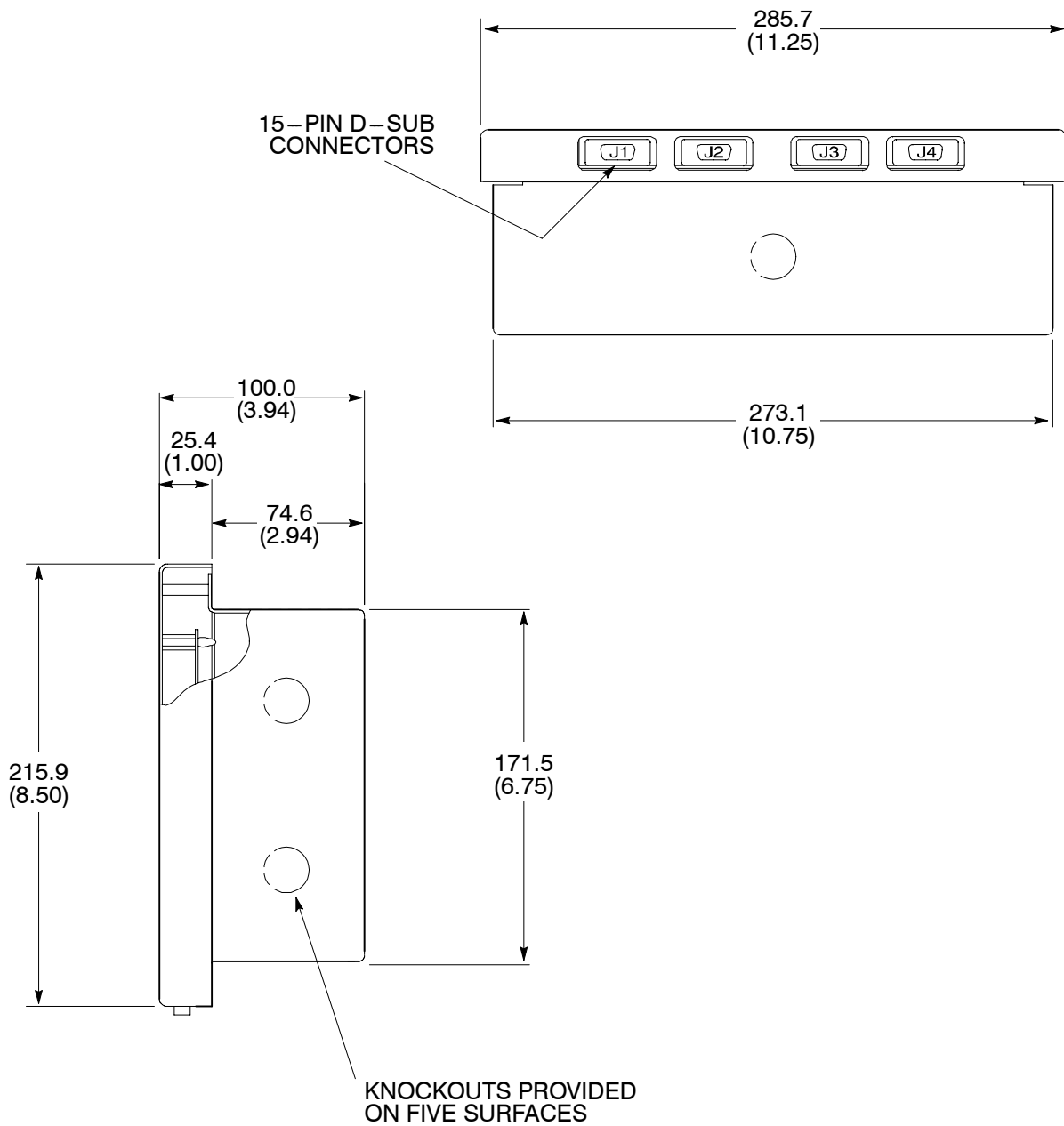




CONDUIT AND WIRING SUPPLIED BY CUSTOMER.
 Maximum distance between RIM and SBM not to exceed 500 feet. Wires must be twisted.
 MAX WIRE SIZE NO. 14 AWG.
 MIN WIRE SIZE NO. 18 AWG.

Dimensions are in millimeters (inches)

DESCRIPTION:		
RELAY INTERFACE MODULE		
DRAWING NO:	164201373-9	SHEET: 1 of 2



Dimensions are in millimeters (inches)

DESCRIPTION:

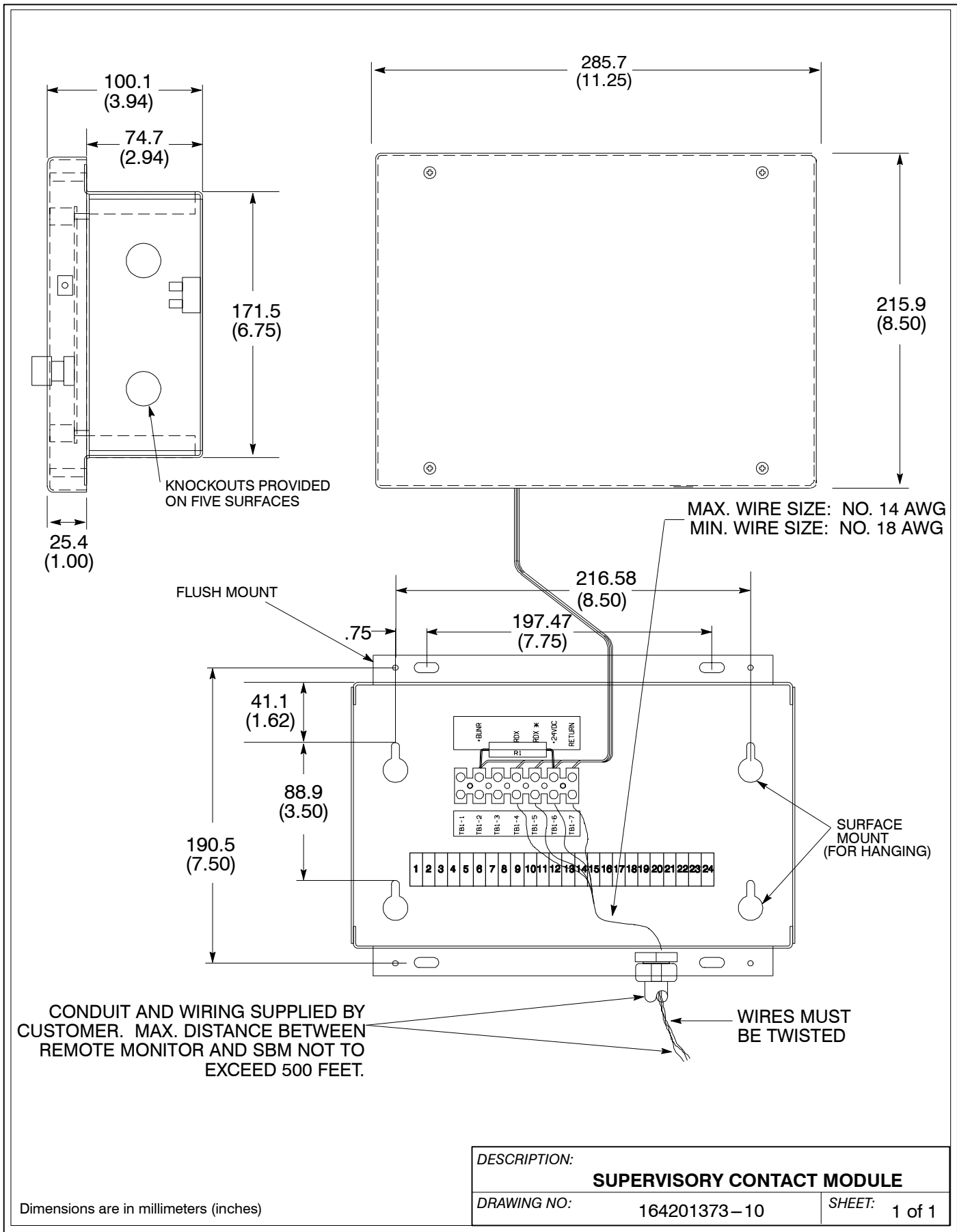
RELAY INTERFACE MODULE

DRAWING NO:

164201373-9

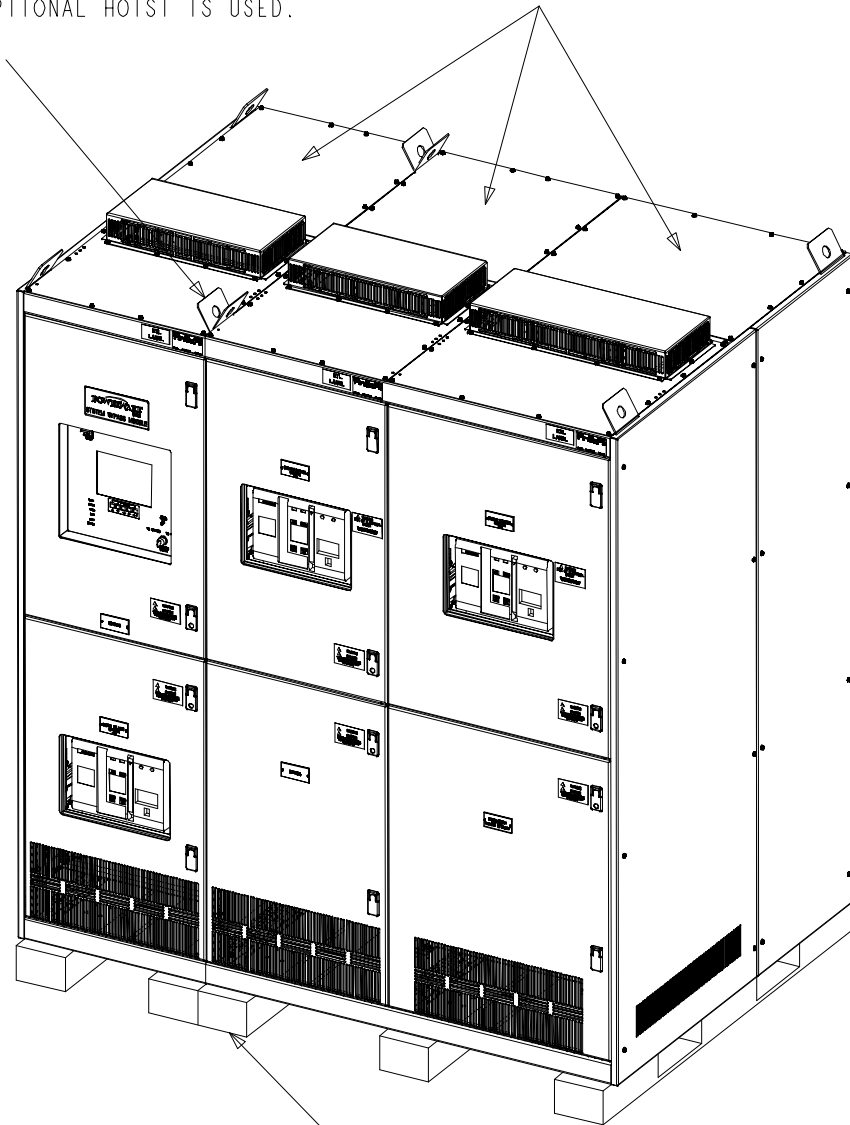
SHEET:

2 of 2



REMOVABLE LIFTING BRACKETS (BRACKETS BETWEEN SECTIONS 1 & 2 MUST BE REMOVED BEFORE INSTALLATION AT CUSTOMERS SITE. REMOVAL OF BRACKETS ON EACH END IS REQUIRED IF OPTIONAL HOIST IS USED.)

CUSTOMER TO CUT CONDUIT OPENINGS AS NEEDED IN TOP REAR COVER. (COVER MAY BE REMOVED TO CUT HOLES. COVER NOT DESIGNED TO SUPPORT CONDUIT.)



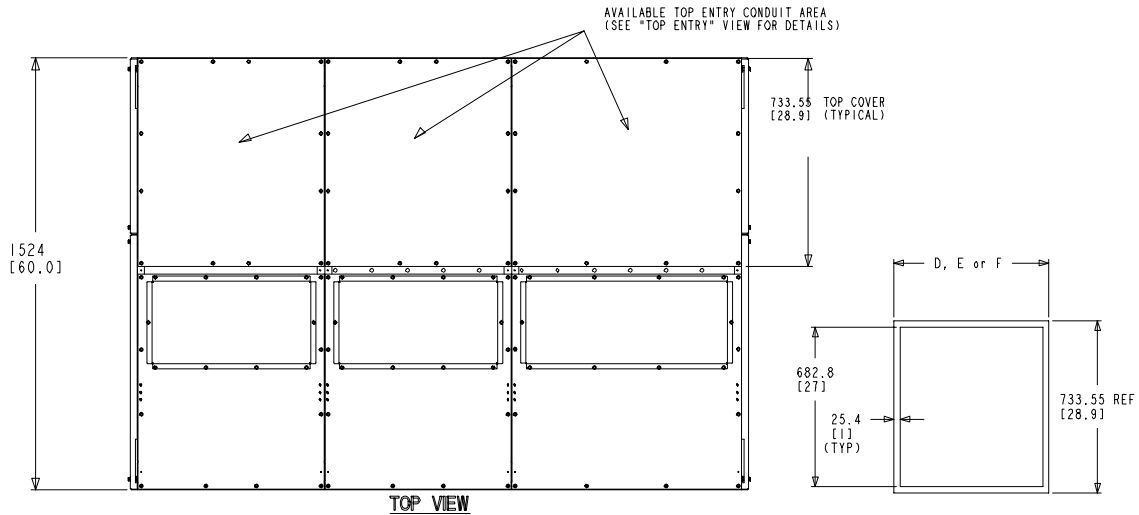
SHIPPING PALLETS TO BE REMOVED FOR INSTALLATION AT CUSTOMER SITE.

WEIGHT WITHOUT BREAKERS & SSW		
SSBM RATING	SECTION 1	SECTION 2 & 3
2500A	601 kg (1325 lbs)	1564.9 kg (3450 lbs)
3000A	601 kg (1325 lbs)	1564.9 kg (3450 lbs)
4000A	1009.2 kg (2225 lbs)	2335.5 kg (5149 lbs)

WEIGHT WITH BREAKERS & SSW		
SSBM RATING	SECTION 1	SECTION 2 & 3
2500A	711 kg (1567 lbs)	2011.9 kg (4435 lbs)
3000A	711 kg (1567 lbs)	2011.9 kg (4435 lbs)
4000A	1147.1 kg (2529 lbs)	2838.1 kg (6257 lbs)

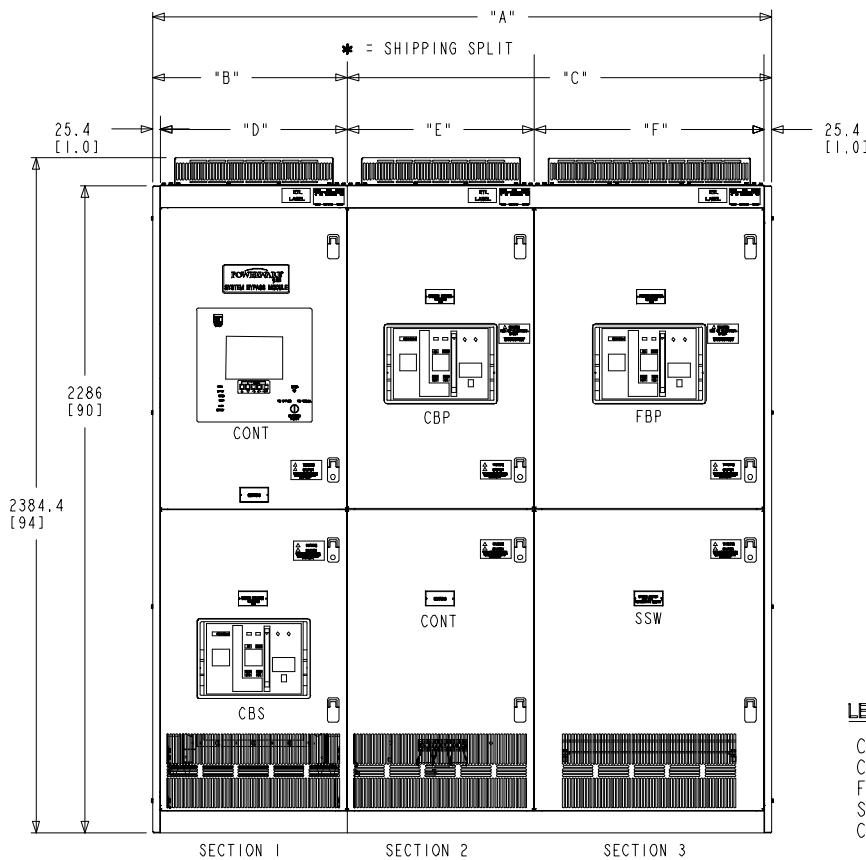
WEIGHT FOR OPTIONAL HOIST: 54.9 kg
(121 lbs)

DESCRIPTION:		
PowerHandlerPlus SSBM		
DRAWING NO:	164201373-11	SHEET: 1 of 4



TOP VIEW

TOP ENTRY
(TYPICAL)
SCALE 0.062



FRONT VIEW

LEGEND

- CBP - SYSTEM BYPASS BREAKER
- CBS - SYSTEM OUTPUT BREAKER
- FBP - FEEDBACK PROTECTION BREAKER
- SSW - STATIC SWITCH
- CONT - CONTROLS

SSBM RATING	DIMENSION										
	A	B	C	D	E	F	G	H	I	J	K
2500A	2184.4 [86.0]	685.8 [27.0]	1498.6 [59.0]	660.4 [26.0]	660.4 [26.0]	812.8 [32.0]	736.6 [29.0]	1397.0 [55.0]	1549.4 [61.0]	2057.4 [81.0]	2133.6 [84.0]
3000A	2184.4 [86.0]	685.8 [27.0]	1498.6 [59.0]	660.4 [26.0]	660.4 [26.0]	812.8 [32.0]	736.6 [29.0]	1397.0 [55.0]	1549.4 [61.0]	2057.4 [81.0]	2133.6 [84.0]
4000A	2489.2 [98.0]	838.2 [33.0]	1651.0 [65.0]	812.8 [32.0]	812.8 [32.0]	812.8 [32.0]	736.6 [29.0]	1549.4 [61.0]	1701.8 [67.0]	2362.2 [93.0]	2438.4 [96.0]

DESCRIPTION:

PowerHandlerPlus SSBM

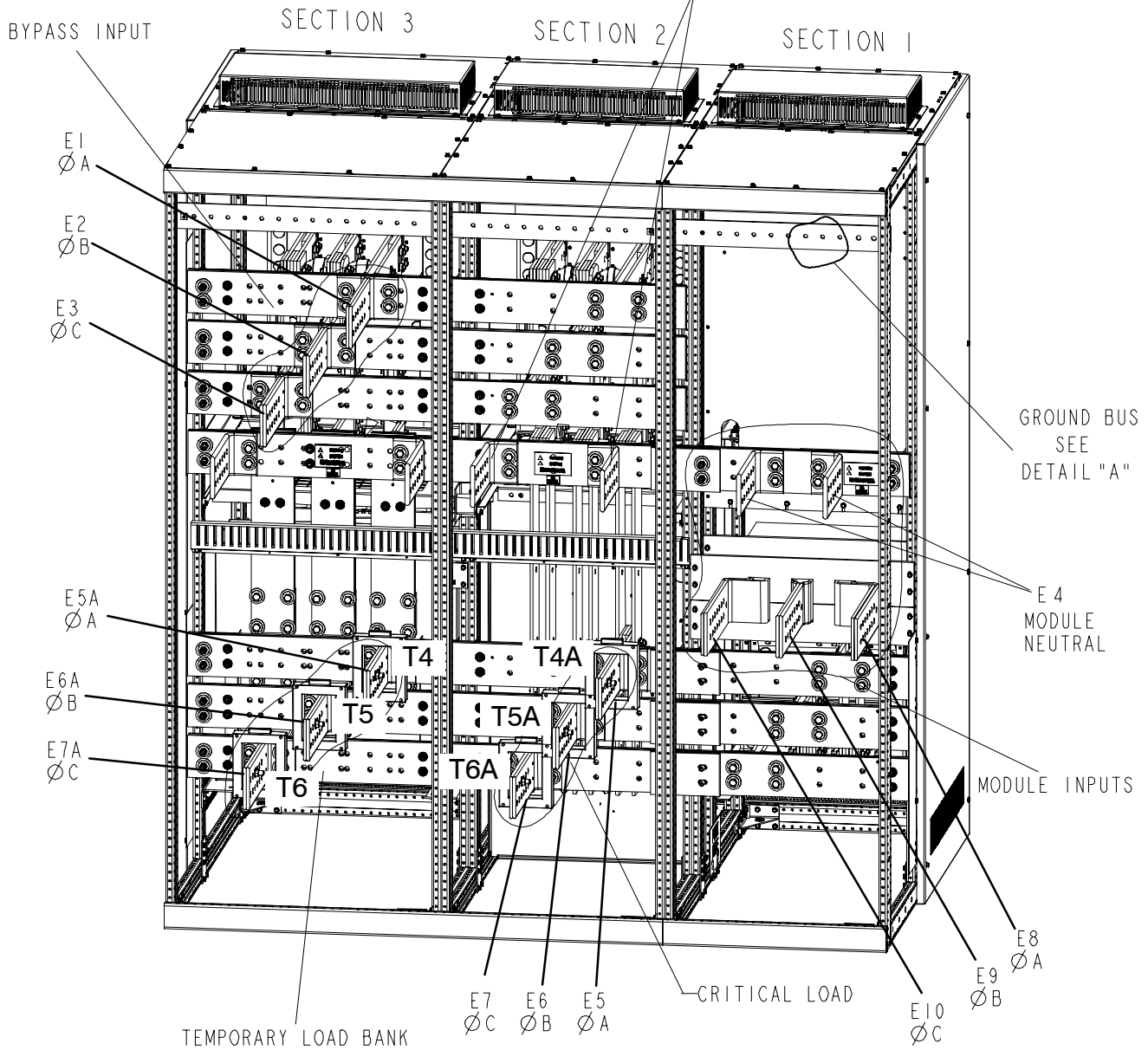
DRAWING NO:

164201373-11

SHEET:

2 of 4

For 3 Phase, 4 wire SSBM option ONLY:
Neutral Bus in Sections 2 and 3.



NOTES:

1. POWER & CONTROL WIRING MAY COME THROUGH TOP OR BOTTOM ACCESS AREAS CLOSEST TO TERMINATION IN SWITCHBOARD. SEE TOP OR BOTTOM VIEWS FOR SPECIFIC DIMENSIONS OF EACH SECTION.
2. CABINETS BOLT TOGETHER WITH M10 BOLTS, 3 IN FRONT & 3 IN REAR (SUPPLIED BY MFR.).
3. OVERALL DIMENSIONS DO NOT INCLUDE BOLT HEADS TO SECURE FRONT, SIDE & REAR PANELS.
4. RECOMMENDED MINIMUM CLEARANCE OVER SWITCHBOARD IS 304.8MM [12.0].
5. RECOMMENDED MINIMUM CLEARANCE BEHIND AND IN FRONT OF SWITCHBOARD IS 812.8MM [32.0].
6. SWITCHBOARD TO BE MAINTAINED UPRIGHT $\pm 15^\circ$ DURING HANDLING.
7. CONTROL WIRING TERMINALS WILL ACCEPT #22 - #12 AWG WIRES.

DESCRIPTION:

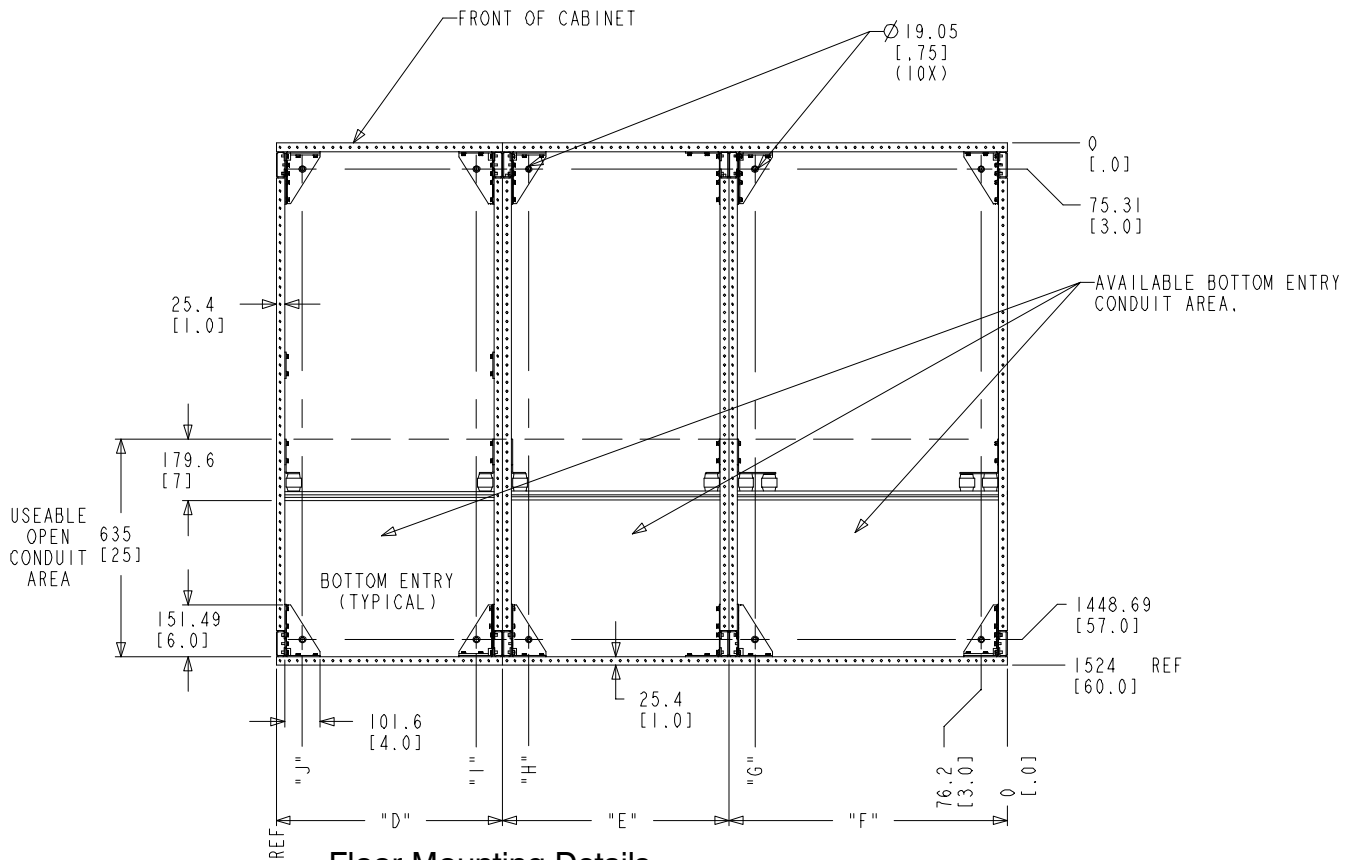
PowerHandlerPlus SSBM

DRAWING NO:

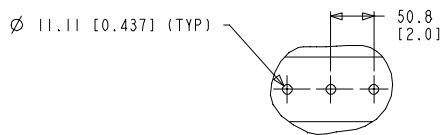
164201373-11

SHEET:

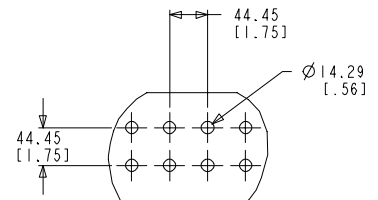
3 of 4



Floor Mounting Details
 (NOTE: Frame and bottom main bus shown only for clarity.)



DETAIL "GND BUS"
 SCALE 0.187



DETAIL "BUS DETAIL"
 SCALE 0.187

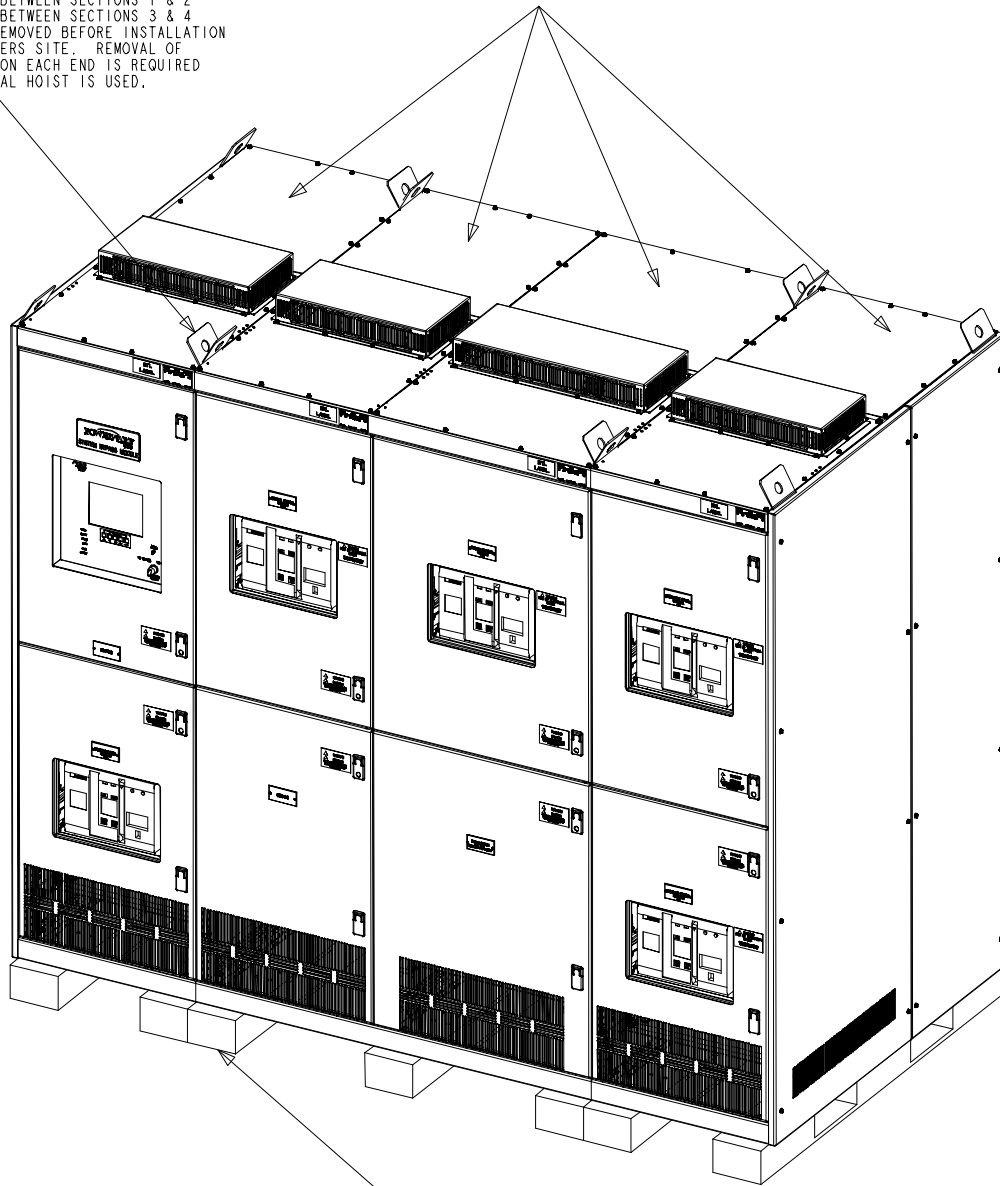
(PARTIAL VIEW OF BUS, SEE TABLE BELOW FOR SPECIFIC NUMBER OF CABLES AT EACH CONNECTION LOCATION)

CONNECTION	TERMINALS	NUMBER OF CABLE TERMINATIONS		
		2500A SSBM	3000A SSBM	4000A SSBM
BYPASS INPUT	E1 TO E3	12	12	12
CRITICAL LOAD	E5 TO E7	12	12	12
TEMPORARY LOAD BANK	E5A TO E7A	12	12	12
MODULE INPUTS	E8 TO E10	14	14	14
NEUTRAL BUS - SECTION 1	E4	24	24	24
NEUTRAL BUS - SECTION 2 (OPTION)	E4	24	24	24
NEUTRAL BUS - SECTION 3 (OPTION)	E4	24	24	24
GROUND BUS - SECTION 1	GND	24	24	30
GROUND BUS - SECTION 2	GND	20	20	30
GROUND BUS - SECTION 3	GND	28	28	30

DESCRIPTION:		
PowerHandlerPlus SSBM		
DRAWING NO:	164201373-11	SHEET: 4 of 4

REMOVABLE LIFTING BRACKETS
BRACKETS BETWEEN SECTIONS 1 & 2
BRACKETS BETWEEN SECTIONS 3 & 4
MUST BE REMOVED BEFORE INSTALLATION
AT CUSTOMERS SITE. REMOVAL OF
BRACKETS ON EACH END IS REQUIRED
IF OPTIONAL HOIST IS USED.

CUSTOMER TO CUT CONDUIT OPENINGS AS
NEEDED IN TOP REAR COVER. (COVER MAY
BE REMOVED TO CUT HOLES. COVER NOT
DESIGNED TO SUPPORT CONDUIT.)



SHIPPING PALLETS TO BE REMOVED BEFORE
INSTALLATION AT CUSTOMER SITE.

WEIGHT WITHOUT BREAKERS & SSW			
SSBM/SMB RATING	SECTION 1	SECTION 2 & 3	SECTION 4
2500A	601 kg (1325 lbs)	1564.9 kg (3450 lbs)	802.9 kg (1770 lbs)
3000A	601 kg (1325 lbs)	1564.9 kg (3450 lbs)	802.9 kg (1770 lbs)
4000A	1009.2 kg (2225 lbs)	2335.5 kg (5149 lbs)	1646 kg (3629 lbs)

WEIGHT WITH BREAKERS & SSW			
SSBM/SMB RATING	SECTION 1	SECTION 2 & 3	SECTION 4
2500A	711 kg (1567 lbs)	2011.9 kg (4435 lbs)	1022.3 kg (2252 lbs)
3000A	711 kg (1567 lbs)	2011.9 kg (4435 lbs)	1022.3 kg (2252 lbs)
4000A	1147.1 kg (2529 lbs)	2838.1 kg (6257 lbs)	1928 kg (4237 lbs)

DESCRIPTION:

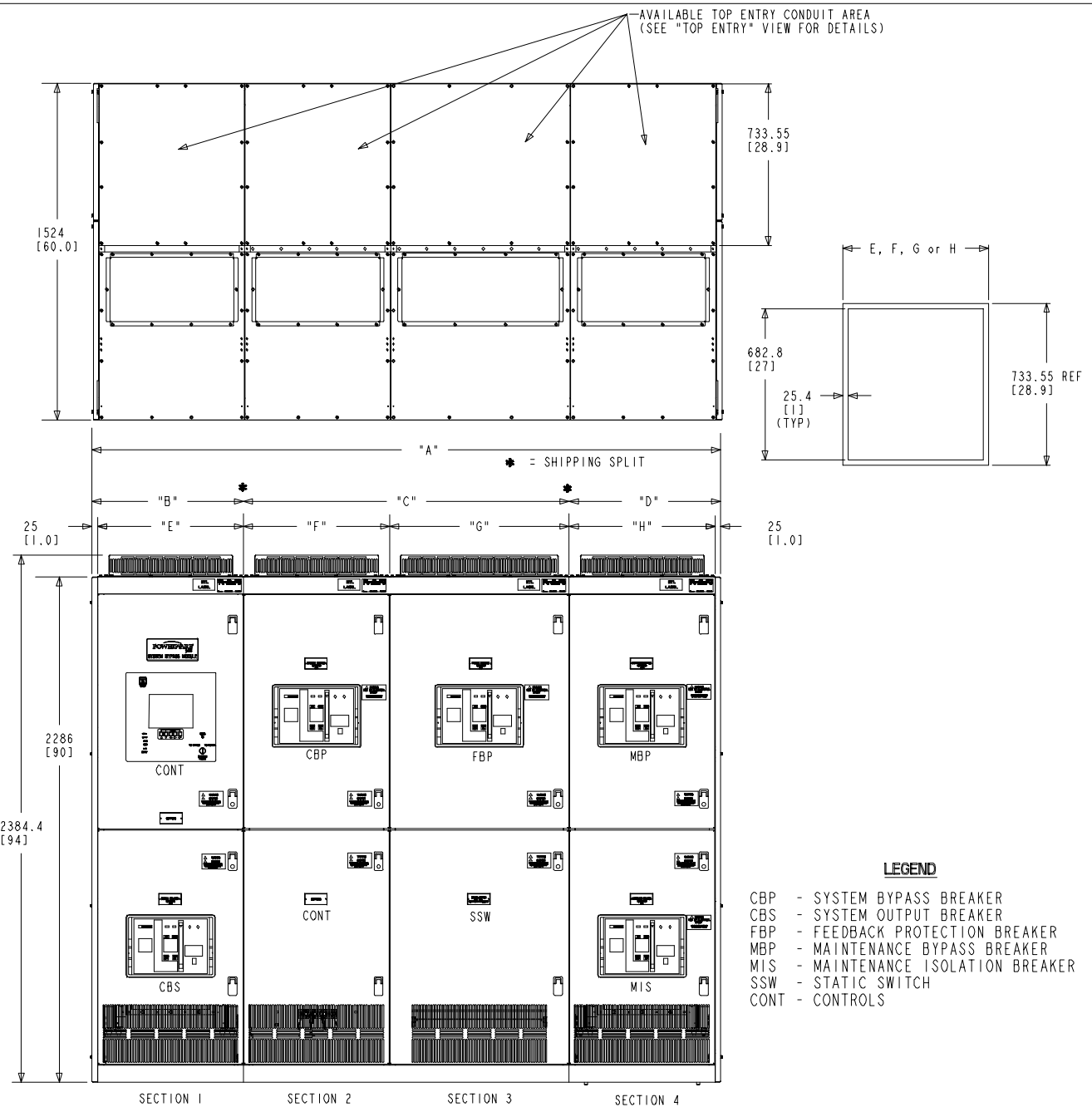
PowerHandlerPlus SSBM with SMB

DRAWING NO:

164201373-12

SHEET:

1 of 4

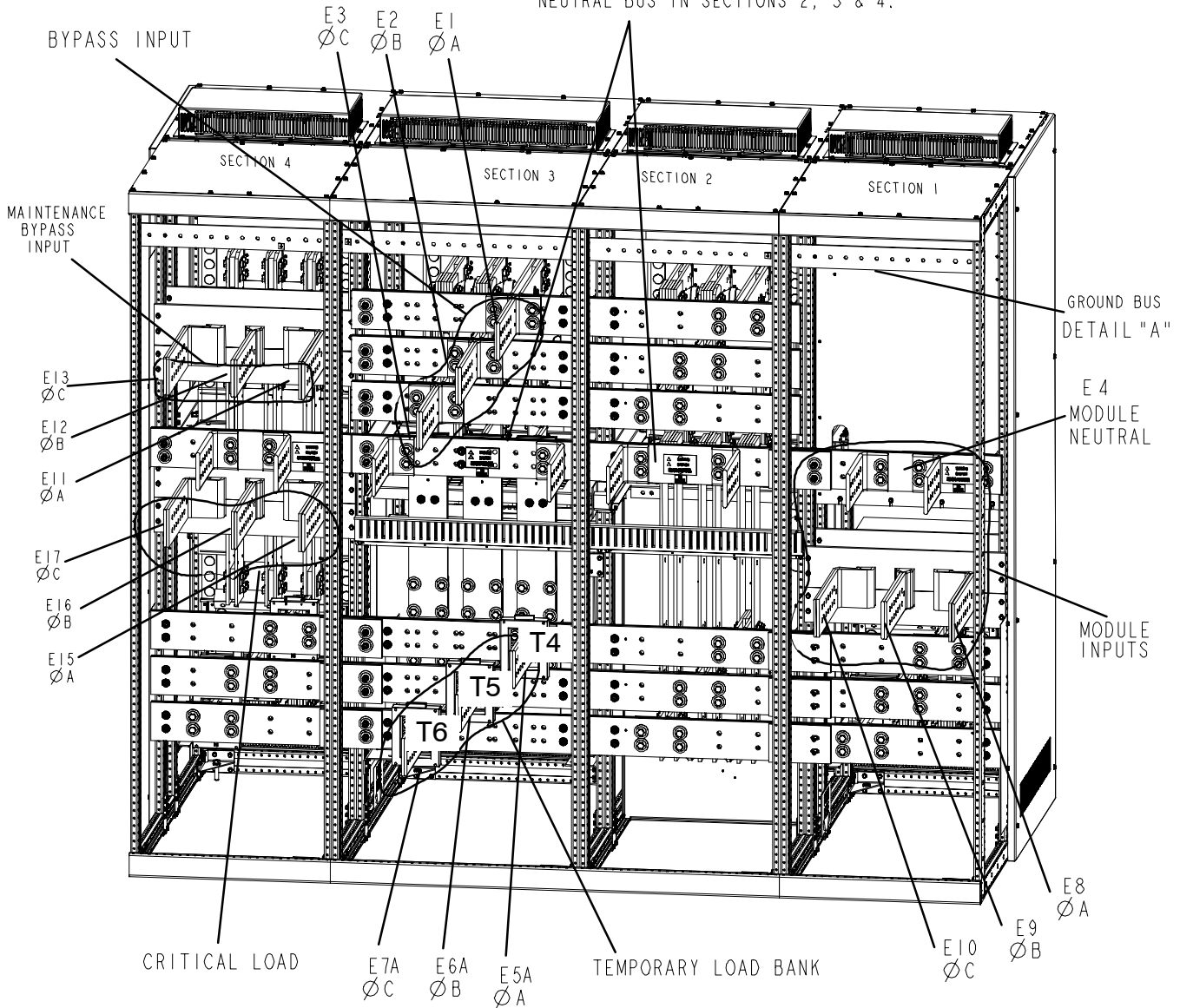


SSBM/SMB RATING	DIMENSION														
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
2500A	2844.8 [112.0]	685.8 [27.0]	1473.2 [58.0]	685.8 [27.0]	660.4 [26.0]	660.4 [26.0]	812.8 [32.0]	660.4 [26.0]	584.2 [23.0]	736.6 [29.0]	1397.0 [55.0]	2057.4 [81.0]	2209.8 [87.0]	2717.8 [107.0]	2794.0 [110.0]
3000A	2844.8 [112.0]	685.8 [27.0]	1473.2 [58.0]	685.8 [27.0]	660.4 [26.0]	660.4 [26.0]	812.8 [32.0]	660.4 [26.0]	584.2 [23.0]	736.6 [29.0]	1397.0 [55.0]	2057.4 [81.0]	2209.8 [87.0]	2717.8 [107.0]	2794.0 [110.0]
4000A	3505.2 [138.0]	838.2 [33.0]	1625.6 [64.0]	1041.4 [41.0]	812.8 [32.0]	812.8 [32.0]	812.8 [32.0]	1016.0 [40.0]	939.8 [37.0]	1092.2 [43.0]	1752.6 [69.0]	2565.4 [101.0]	2717.8 [107.0]	3378.2 [133.0]	3454.0 [136.0]

DESCRIPTION: **PowerHandlerPlus SSBM with SMB**

DRAWING NO: 164201373-12 SHEET: 2 of 4

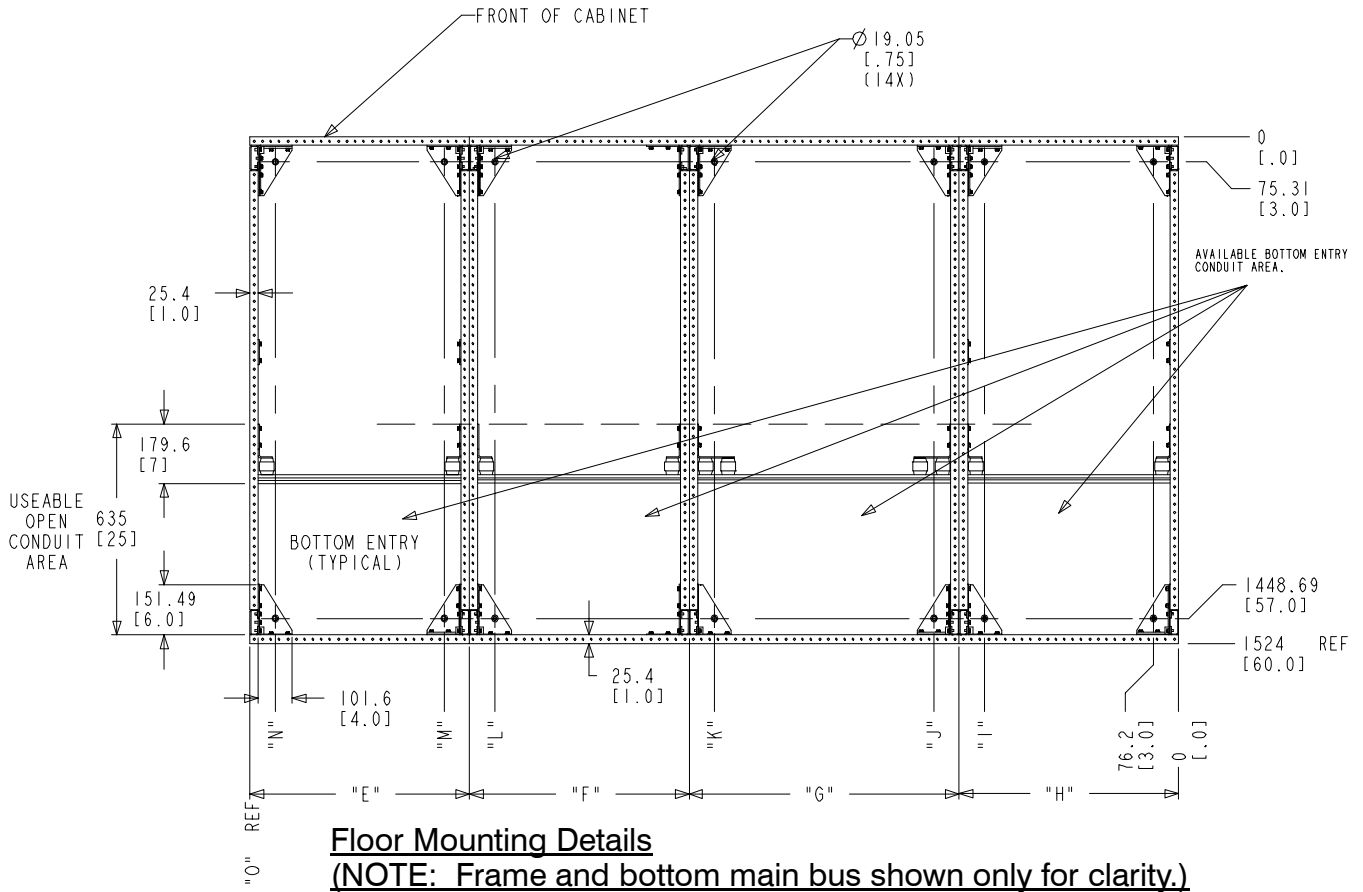
FOR 3 PHASE, 4 WIRE SSBM/SMB OPTION ONLY:
NEUTRAL BUS IN SECTIONS 2, 3 & 4.



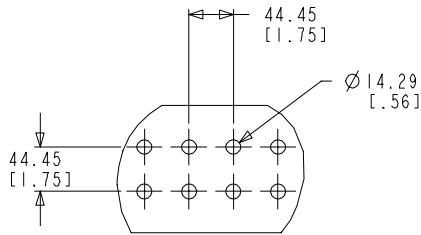
NOTES:

1. POWER & CONTROL WIRING MAY COME THROUGH TOP OR BOTTOM ACCESS AREAS CLOSEST TO TERMINATION IN SWITCHBOARD. SEE TOP OR BOTTOM VIEWS FOR SPECIFIC DIMENSIONS OF EACH SECTION.
2. CABINETS BOLT TOGETHER WITH M10 BOLTS, 3 IN FRONT & 3 IN REAR (SUPPLIED BY MFR.).
3. OVERALL DIMENSIONS DO NOT INCLUDE BOLT HEADS TO SECURE FRONT, SIDE & REAR PANELS.
4. RECOMMENDED MINIMUM CLEARANCE OVER SWITCHBOARD IS 304.8MM [12.0].
5. RECOMMENDED MINIMUM CLEARANCE BEHIND AND IN FRONT OF SWITCHBOARD IS 1016.0MM [40.0].
6. SWITCHBOARD TO BE MAINTAINED UPRIGHT $\pm 15^\circ$ DURING HANDLING.
7. CONTROL WIRING TERMINALS WILL ACCEPT #22 - #12 AWG WIRES.

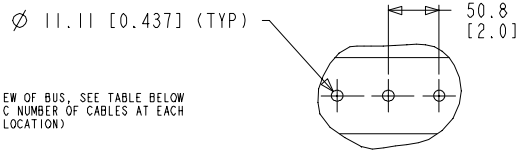
DESCRIPTION:		PowerHandlerPlus SSBM with SMB
DRAWING NO:	164201373-12	SHEET: 3 of 4



Floor Mounting Details
 (NOTE: Frame and bottom main bus shown only for clarity.)



DETAIL "BUS DETAIL"
 SCALE 0.87



DETAIL "GND BUS"
 SCALE 0.87

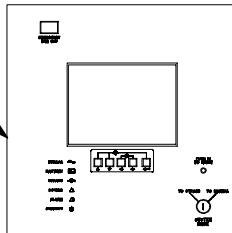
(PARTIAL VIEW OF BUS. SEE TABLE BELOW FOR SPECIFIC NUMBER OF CABLES AT EACH CONNECTION LOCATION)

CONNECTION	TERMINALS	NUMBER OF CABLE TERMINATIONS		
		2500A SSBM/SMB	3000A SSBM/SBM	4000A SSBM/SMB
BYPASS INPUT	E1 TO E3	12	12	12
CRITICAL LOAD	E15 TO E17	14	14	14
TEMPORARY LOAD BANK	E5A TO E7A	12	12	12
MODULE INPUTS	E8 TO E10	14	14	14
MAINTENANCE BYPASS INPUT	E11 TO E13	14	14	14
NEUTRAL BUS - SECTION 1	E4	24	24	24
NEUTRAL BUS - SECTION 2-4 (OPT)	E4	24	24	24
GROUND BUS - SECTION 1	GND	24	24	30
GROUND BUS - SECTION 2	GND	20	20	30
GROUND BUS - SECTION 3	GND	28	28	30
GROUND BUS - SECTION 4	GND	24	24	38

DESCRIPTION:	PowerHandlerPlus SSBM with SMB	
DRAWING NO:	164201373-12	SHEET: 4 of 4

POWERWARE
9315
SYSTEM BYPASS MODULE

CONTROL/MONITOR PANEL



FRONT VIEW

DESCRIPTION:

TYPICAL SSBM CONTROL SECTION

DRAWING NO:

164201373-13

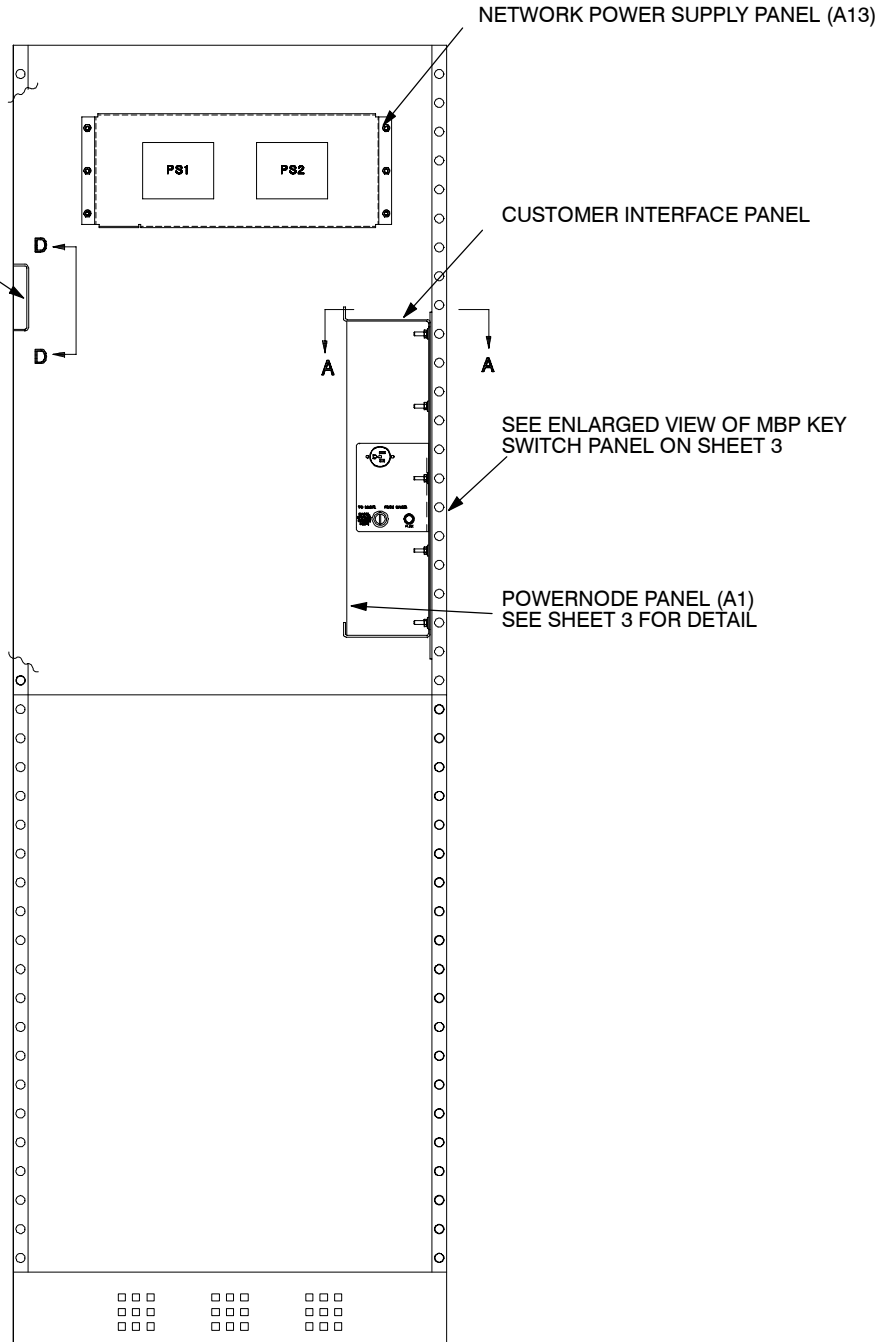
SHEET:

1 of 4

110915520

SMB CONTROL PANEL (OPTIONAL)
WILL BE ONE OF THE FOLLOWING:

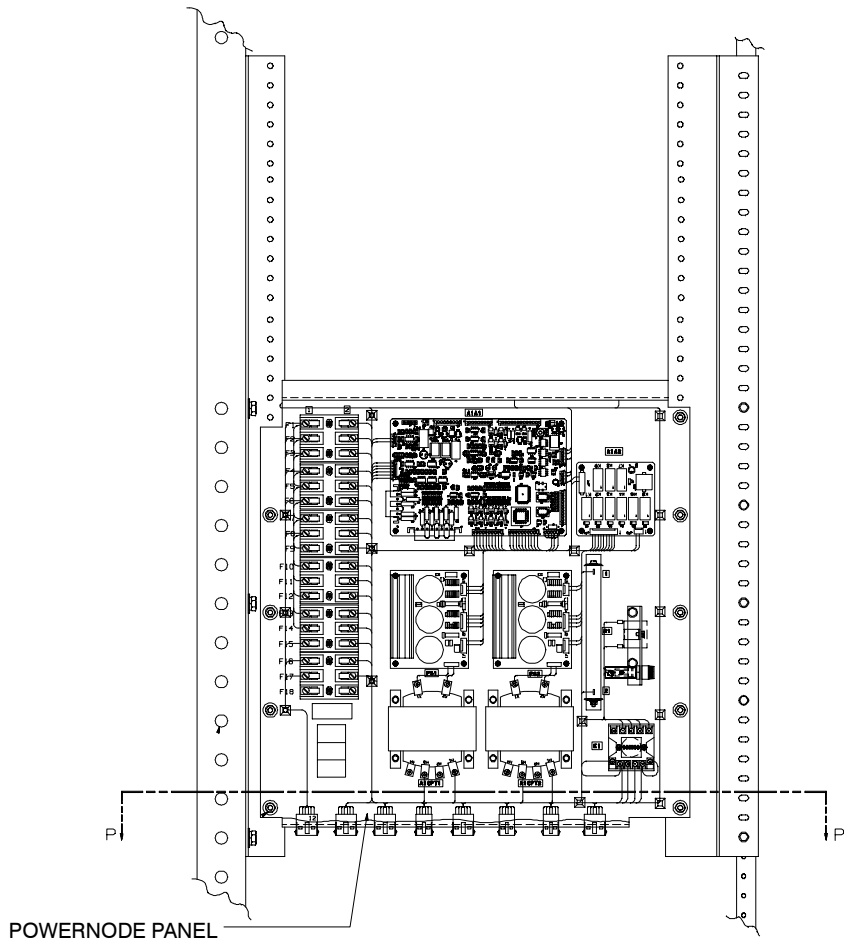
SMB ELECTRICAL INTERLOCK (A10)
OR
SMB ELECTRICAL INTERLOCK WITH
REDUNDANT CBP (A11)



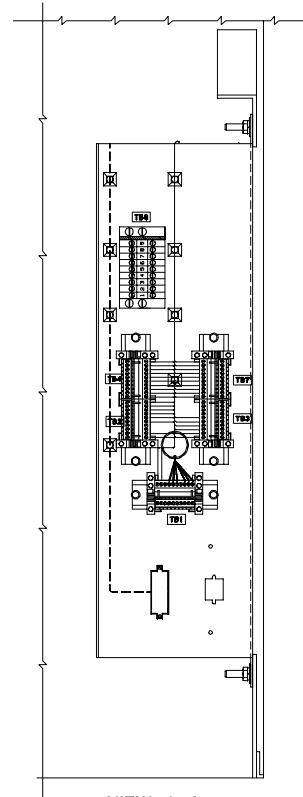
FRONT VIEW
FRONT DOORS REMOVED

<i>DESCRIPTION:</i>		
TYPICAL SSBM CONTROL SECTION		
<i>DRAWING NO:</i>	164201373-13	<i>SHEET:</i> 2 of 4

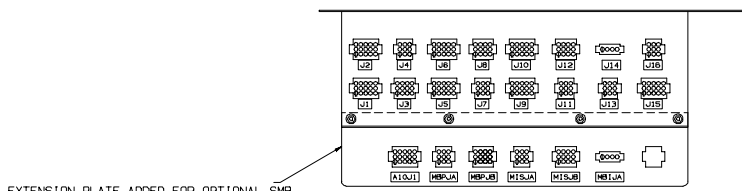
110915520



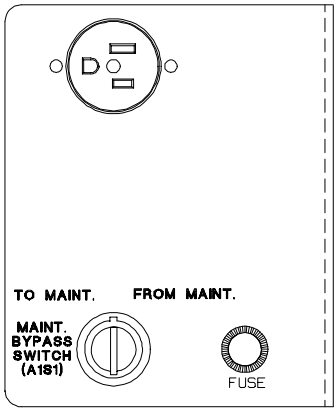
**VIEW B-B SHOWING
POWERNODE PANEL (A1) MOUNTED**



**VIEW A-A
CUSTOMER
INTERFACE PANEL**



**VIEW IN DIRECTION P-P
(SHOWING ALL M-N-L CAPS)**

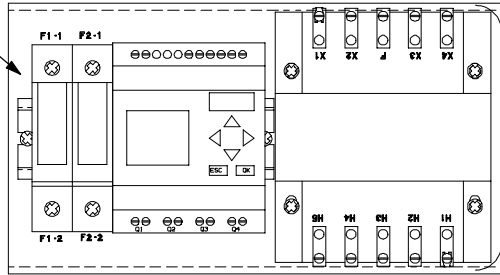


**ENLARGED VIEW OF
MAINT. BYPASS KEY SWITCH PANEL
(OPTIONAL)**

DESCRIPTION:		
TYPICAL SSBM CONTROL SECTION		
DRAWING NO:	164201373-13	SHEET: 3 of 4

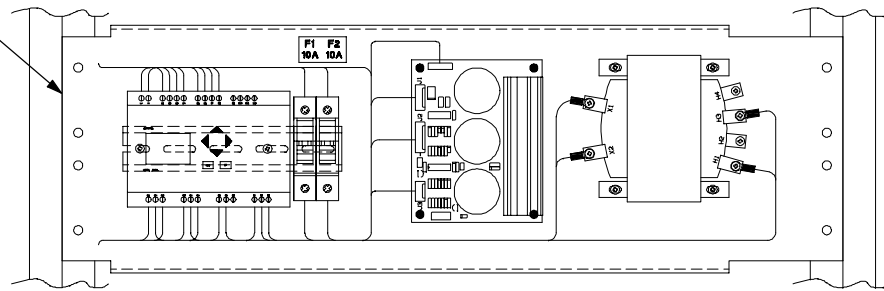
110915520

SMB ELECTRICAL INTERLOCK
PANEL (A10) (OPTIONAL)



ENLARGED VIEW
VIEW D-D

SMB ELECTRICAL INTERLOCK
PANEL (A11) WITH REDUNDANT CBP
CONTROLS (OPTIONAL)



ENLARGED VIEW
VIEW D-D

110915520

DESCRIPTION:		
TYPICAL SSBM CONTROL SECTION		
DRAWING NO:	164201373-13	SHEET: 4 of 4

Table O. UPM Output-to-SSBM Cable and Conduit Configurations: Based on UPM Manuals

9315 Model - kVA/kW	Output Voltage	Output Current	UPM Output-to-SSBM Cable Configuration Minimum Conductor Size, 3Ø, (1) Neutral, (1) Gnd			Max No. of UPMs Connectable to each SSBM (Based on UPM-to-SSBM Cable Configuration)		
			Conductor Size (AWG or kcmil)	Number of Conductors per Ø and Neutral	Number and Size of Conduit (in inches)	Model 2500	Model 3000	Model 4000
200 – 200/160	400	290	4/0	2	2 – 2.0	7	7	7
225 – 225/180	208	625	350	3	3 – 2.0	4	4	4
225 – 225/180	480	271	3/0	2	1 – 2.0	7	7	7
300 – 225/180	480	271	3/0	2	1 – 2.0	7	7	7
300 – 225/180	600	217	350	1	1 – 2.0	8	8	8
300 – 300/240	208	830	500*	3	3 – 3.0	4	4	4
300 – 300/240	480	360	250	2	2 – 2.0	7	7	7
300 – 300/240	600	289	4/0	2	2 – 2.0	7	7	7
250 – 200/160	400	290	4/0	2	2 – 2.0	7	7	7
250 – 250/200	400	360	250	2	2 – 2.0	7	7	7
400 – 300/240	400	433	3/0	3	3 – 2.5	4	4	4
400 – 400/320	400	577	250	3	3 – 2.5	4	4	4
500 – 400/320	208	1110	600*	5	5 – 3.0	2	2	2
500 – 400/320	480	480	250	3	3 – 3.0	4	4	4
500 – 500/400	480	601	350	3	3 – 3.0	4	4	4
500 – 500/400	600	601	350	3	3 – 3.0	4	4	4
625 – 500/400	400	722	300	4	3 – 3.0	3	3	3
625 – 500/450	400	722	300	4	3 – 3.0	3	3	3
625 – 625/500	400	902	500	4	3 – 3.5	3	3	3
625 – 626/562	400	902	500	4	3 – 3.5	3	3	3
750 – 625/500	480	752	500	3	3 – 3.0	4	4	4
750 – 625/500	600	601	350	3	3 – 3.0	4	4	4
750 – 625/562	480	752	500	3	3 – 3.0	4	4	4
750 – 625/562	600	601	350	3	3 – 3.0	4	4	4
750 – 750/600	480	902	400	4	3 – 3.5	3	3	3
750 – 750/600	600	722	500	3	3 – 3.0	4	4	4
750 – 750/675	480	902	400	4	3 – 3.5	3	3	3
750 – 750/675	600	722	500	3	3 – 3.0	4	4	4

NOTES:

- * = Connections to output transformer, not UPM. Refer to applicable Powerware 9315 UPS Installation manual for UPS cable requirements between the UPS and its output transformer.

DESCRIPTION:	UPM OUTPUT-TO-SSBM CABLE AND CONDUIT CONFIGURATIONS	
DRAWING NO:	164201373-14	SHEET: 1 of 2

Table P. UPM Output-to-SSBM Cable and Conduit Configurations: For Max Number of UPMs

9315 Model - kVA/kW	Output Voltage	Output Current	UPM Output-to-SSBM Cable Configuration Minimum Conductor Size, 3Ø, (1) Neutral, (1) Gnd			Max No. of UPMs Connectable to each SSBM (Based on UPM-to-SSBM Cable Configuration)		
			Conductor Size (AWG or kcmil)	Number of Conductors per Ø and Neutral	Number and Size of Conduit (in inches)	Model 2500	Model 3000	Model 4000
200 – 200/160	400	290	500	1	1 – 3.5	8	8	8
225 – 225/180	208	625	500	2	2 – 3.5	7	7	7
225 – 225/180	480	271	400	1	1 – 3.0	8	8	8
300 – 225/180	480	271	400	1	1 – 3.0	8	8	8
300 – 225/180	600	217	300	1	1 – 3.0	8	8	8
300 – 300/240	208	830	400*	3	3 – 3.0	4	4	4
300 – 300/240	480	360	4/0	2	2 – 2.5	7	7	7
300 – 300/240	600	289	500	1	1 – 3.5	8	8	8
250 – 200/160	400	290	500	1	1 – 3.5	8	8	8
250 – 250/200	400	360	4/0	2	2 – 2.5	7	7	7
400 – 300/240	400	433	300	2	2 – 3.0	7	7	7
400 – 400/320	400	577	500	2	2 – 3.5	7	7	7
500 – 400/320	208	1110	500*	4	4 – 3.5	3	3	3
500 – 400/320	480	480	350	2	2 – 3.0	7	7	7
500 – 500/400	480	600	500	2	2 – 3.5	7	7	7
500 – 500/400	600	480	350	2	2 – 3.0	7	7	7
625 – 500/400	400	722	350	3	3 – 3.0	4	4	4
			700	2	2 – 4.0	7	7	7
625 – 500/450	400	722	350	3	3 – 3.0	4	4	4
			700	2	2 – 4.0	7	7	7
625 – 625/500	400	902	500	3	3 – 3.5	4	4	4
625 – 626/562	400	902	500	3	3 – 3.5	4	4	4
750 – 625/500	480	752	350	3	3 – 3.0	4	4	4
			700	2	2 – 4.0	7	7	7
750 – 625/500	600	601	500	2	2 – 3.5	7	7	7
750 – 625/562	480	752	350	3	3 – 3.0	4	4	4
			700	2	2 – 4.0	7	7	7
750 – 625/562	600	601	500	2	2 – 3.5	7	7	7
750 – 750/600	480	902	500	3	3 – 3.5	4	4	4
750 – 750/600	600	722	350	3	3 – 3.0	4	4	4
			700	2	2 – 4.0	7	7	7
750 – 750/675	480	902	500	3	3 – 3.5	4	4	4
750 – 750/675	600	722	350	3	3 – 3.0	4	4	4
			700	2	2 – 4.0	7	7	7

NOTES:

1. The cable configurations shown support connection of the maximum number of UPMs for each SSBM model. The maximum number of UPMs connected to any SSBM shall not exceed eight.
2. Maximum conductor size considered: 700 kcmil.
3. * = Connections to output transformer, not UPM. Refer to applicable Powerware 9315 UPS Installation manual for UPS cable requirements between the UPS and its output transformer.

DESCRIPTION:	UPM OUTPUT-TO-SSBM CABLE AND CONDUIT CONFIGURATIONS	
DRAWING NO:	164201373–14	SHEET: 2 of 2

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LIMITED FACTORY WARRANTY FOR THREE-PHASE POWERWARE PRODUCTS

This Warranty applies only to units installed in the Fifty (50) United States of America. Subject to the conditions herein, Powerware Corporation (Powerware®) warrants solely to the initial end-user the electronics (the "Unit") against defects in material and workmanship for a period of 12 months from the date of equipment start up or 18 months from date of receipt by end-user, whichever occurs first.

If, in the opinion of Powerware, the Unit fails to meet published specifications and the defect is within the terms of this warranty, the Unit will be repaired or replaced at the option of Powerware with no charge for replacement parts. Labor required, to make the repairs or replacement installation, and travel costs incurred by Powerware's representatives, is not included under the terms of this Limited Warranty, except for labor required during the first 90 days after the date of delivery, provided that startup, of the unit onsite, has been performed by Powerware. Equipment sold, but not manufactured, by Powerware, e.g., batteries and only the manufacturer of such equipment shall warrant battery racks. Equipment repaired or replaced pursuant to this warranty will be warranted for the remaining portion of the original warranty subject to all the terms thereof.

This warranty does not apply to any Unit that has been subject to neglect, accident, abuse, misuse, misapplication, incorrect installation, or that has been subject to repair or alteration, not authorized in writing by Powerware' personnel, Purchaser shall be invoiced for, and shall pay for, all services not expressly provided for by the terms hereof, including, without limitation, site calls involving an inspection which determines no corrective maintenance is required. THIS WARRANTY IS THE PURCHASER'S (USER'S) SOLE REMEDY AND IS EXPRESSLY IN LIEU OF, AND THERE ARE NOT OTHER, EXPRESSED OR IMPLIED GUARANTEES OR WARRANTIES (INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE, WHICH ARE EXPRESSLY DISCLAIMED). In no case will Powerware's' liability under this Warranty exceed the replacement value of the Unit warranted.

Powerware's obligation, under said warranty, is expressly conditioned upon receipt by Powerware of all payments due it (including interest charges, if any). During such time as Powerware has not received payment of any amount due to Powerware, in accordance with the Contract terms under which the equipment is sold, Powerware shall have no obligation, under said warranty; also during this time, the period of said warranty shall continue to run and the expiration of said warranty shall not be extended upon payment of the overdue amount. These limitations, to said warranty, apply even in the event that the equipment is sold initially by Powerware for resale to an ultimate end-user.

In no event shall Powerware be liable for any indirect, incidental special or consequential damages of any kind or type whatsoever, or based on any claim or cause of action, however denominated. Powerware shall not be responsible for failure to provide service or parts due to causes beyond Powerware's' reasonable control. This limited warranty applies only to the original end user of the unit.

Cost for replacement equipment, installation, material freight charges travel expenses and labor of Powerware representatives will be borne by the Purchaser (user). Any advice furnished the Purchaser before or after delivery in regard to use or application of Powerware equipment is furnished without charge and on the basis that it represents Powerware's best judgment under the circumstances. The use of any such advice by the Purchaser is solely and entirely at its own risk.

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